AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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SEPTEMBER, 1924

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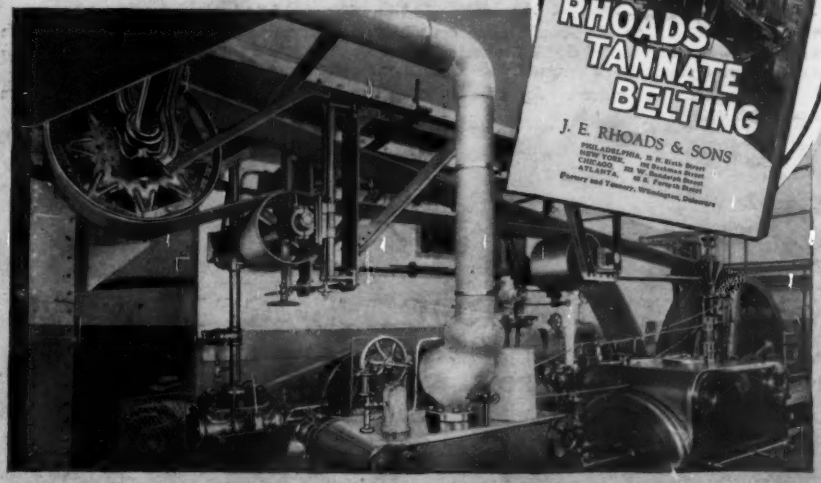
Dalton, and Atlanta, Ga.

Belts with Powerful Pull

THE belt here pictured is a 20" double. Its wonderful Tannate grip greatly pleases its owners. Before it was installed successive 20" Oak belts on this drive showed maximum capacity of only 166 H. P. Both these belts were three ply. This Rhoads Belt, though only a double, delivers 275 H. P. at 2667 F. P. M. a heavy overload, as a result due to the wonderful tractive grip of

RHOADS TANNATE BELTING.

Its grip and strength particularly adapt Tannate to severe drives. Its strength and pliability give it long life. It is not merely a hard-service belt but is economical for the average drive.



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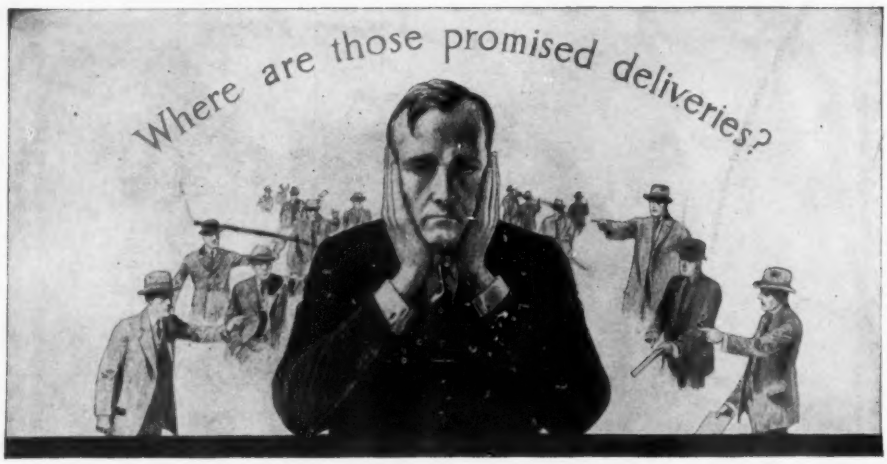


Turn to Us for Help!

SOME makers of colored goods still use warp dyeing. Many of these are constantly annoyed with demands for promised deliveries, which they have been unable to live up to because the dyer has failed to keep his promises.

Are you among these constantly decreasing number? Are you continually harassed with letters, telegrams, telephone calls and irate customers in person? Do the ghosts of threatened lawsuits for breach of contract continually stalk before you during the day and disturb your slumbers at night?

If you are so unfortunate the Franklin Process of dyeing offers a solution to many of your difficulties.

Dyeing yarn in the wound form, this Process gives you an opportunity to exercise considerable foresight in preparing for your dyeing requirements.

You can store your gray yarn with us. You can wind it on Franklin springs before shipping or you can ship it to us on bobbins, tubes, cones or cops and we will wind it to Franklin springs. Thus we constantly have on hand a supply of your yarn all prepared for dyeing.

In this way you can place orders for dyeing with us on short notice, merely specifying colors and quantities, and we can frequently make substantial deliveries within two or three days from receipt of order.

And when the yarn is shipped to you it is on Franklin tubes which will fit into your V creel. There is no beaming of chain warps. We eliminate this process for you.

In the matter of quality, the Franklin Process affords equally attractive advantages. Because it dyes in a highly concentrated dye bath under pressure, it effects an unusually thorough penetration of the yarn, resulting in unusually solid, brilliant and fast colors.

Why not send for our color cards and determine these facts for yourself? They are yours for the asking.

FRANKLIN PROCESS COMPANY

Yarn Dyers *Yarn Spinners* *Mfrs. Glazed Yarns* *Dyeing Machines*

Philadelphia PROVIDENCE Manchester, Eng.

New York Office 72 Leonard St.

SOUTHERN FRANKLIN PROCESS COMPANY

Greenville, S. C.

Reducing the Cost of Labor

The Possibilities of the Northrop Automatic Loom in the way of reducing Cost of Labor are not fully appreciated throughout the trade. Co-operation between our service men and the mills has brought remarkable results in this direction the past two years.

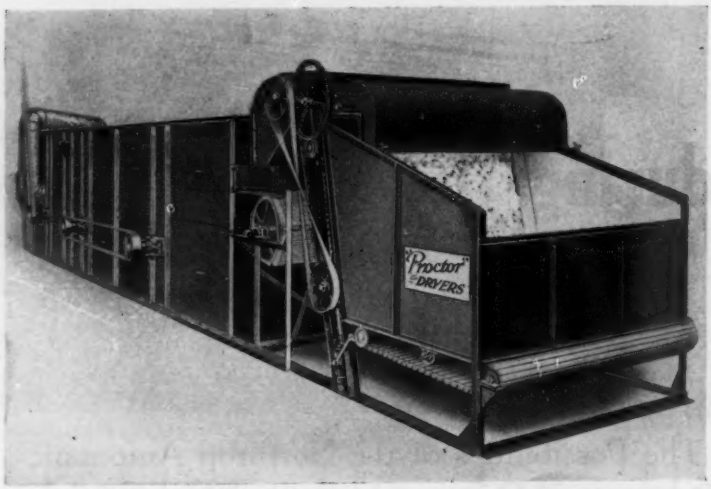
See the special stories in our June and July Cotton Chats.

Let's Talk It Over. We have a story of special pertinence to you and your mill.

DRAPER CORPORATION

Southern Office Atlanta Georgia **Hopedale Massachusetts**

Copyright 1917 by Draper Corporation



Proctor Automatic Dryer for Bleached and Dyed Cotton

Drying Machines for Every Step of Textile Manufacture

Truck Yarn Dryer

THERE'S hardly a drying operation in all textile manufacture with which Proctor Dryer engineers are not fully acquainted. There's scarcely a textile product for which they cannot specify the best means of drying.

This intimate knowledge of approved drying practice is the result of forty-one years' drying experience, during which Proctor Dryers have been evolved in a variety of types which covers every step of textile manufacture.

There are automatic conveyor types of Proctor Dryers for raw cotton, wool and other loose materials; there are automatic and truck types for skein yarn; tray types for package yarns; automatic dryers for warps.

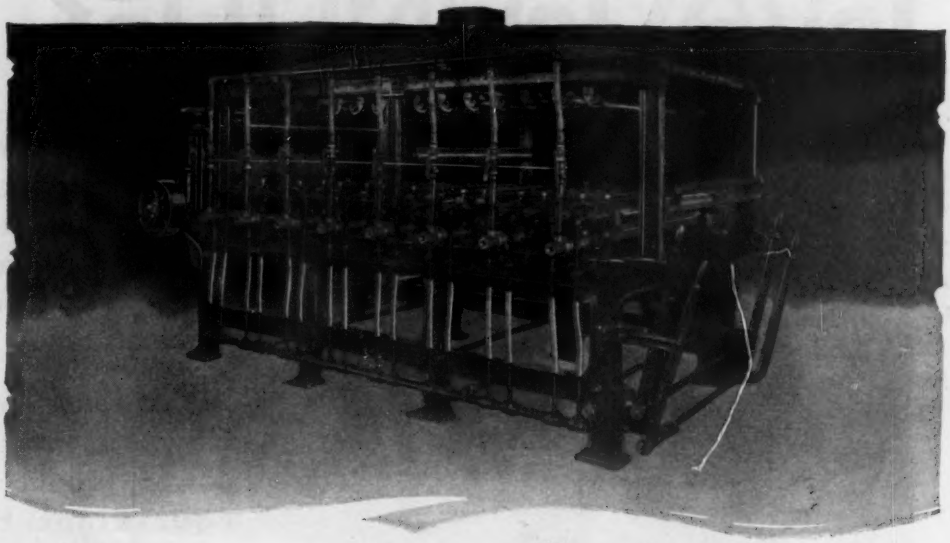
In the finishing stages—for drying piece goods of all kinds, hosiery, carpet; for carbonizing woolen cloth—there are Proctor Dryers, each the best for its specific purpose. And a Proctor housing to increase the efficiency of your tentering machine.

Is there some drying rut in the otherwise smooth road of your production? If so, why not draw on the experience of this organization to help you smooth the road all the way?

PROCTOR & SCHWARTZ, INC.

PHILADELPHIA

SKF



High Temperatures Have Little Effect on Ball Bearings of Gas Singers

DESPITE the high temperature adjacent to the bearings of this gas singer there is little trouble in keeping the thirty-two Skayef Self-Aligning Ball Bearings on the lower rolls properly lubricated. The sealed housings make this possible. They are easily filled and retain the lubricant for long periods without evaporation or deterioration.

Absolute cleanliness is also insured, there being no danger of oil spots on finished goods which would make them seconds. The ball bearing rolls turn easily under the drag of cloth passing through the machine, a contributing factor in maintaining production schedules.

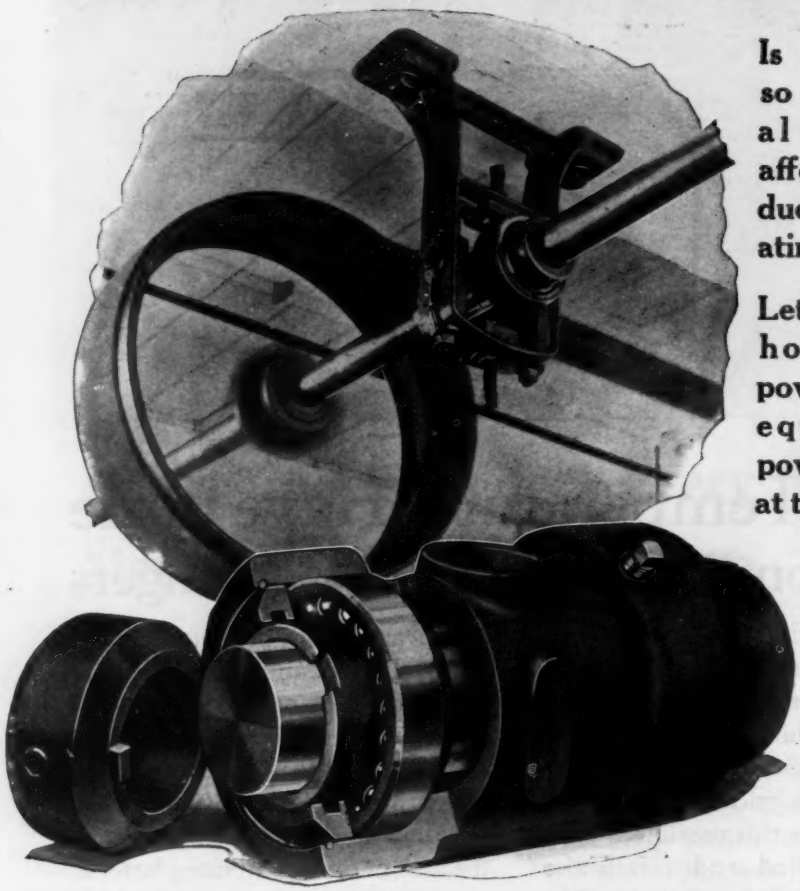
THE SKAYEF BALL BEARING COMPANY

Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City

1234

Normal View *Deflected View*

FAFNIR



Is your business so exceptional than you can afford not to reduce your operating costs?

Let us show you how to make power produced equivalent to power delivered at the machines.

By over 50 actual tests in 24 different industries whose line shaft was equipped with plain bearing boxes, it was proved that Fafnir Ball Bearing Boxes paid for themselves in an average period of 18 months, which meant 66⅔ per cent return on the investment. This is not a generalization but a definitely proved fact.

Let us furnish you with details and without further obligation on your part, make a survey of your plant. We can save in power, in oil and in labor of oiling. We have enabled scores of plants to add more machines on line shafts already overloaded when running on babbitt boxes.

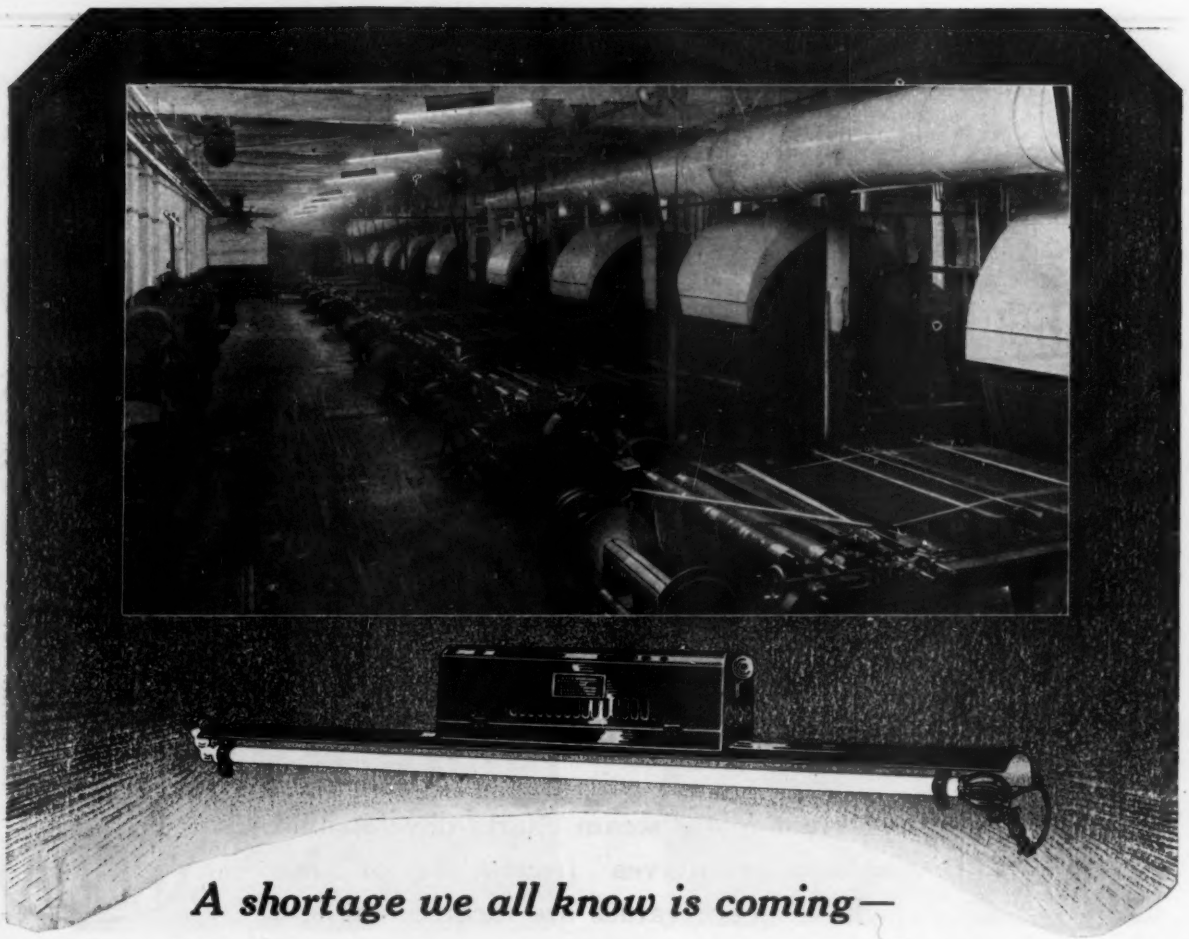
A letter to us will bring a Fafnir Representative to your office.

THE FAFNIR BEARING COMPANY

Southern Representatives

O. R. S. POOL
Charlotte, N. C.

A. G. LAUGHRIDGE
P. O. Box 1847, Atlanta, Ga.



The picture shows how Work-Light illuminates the blue denim slasher room of the Industrial Cotton Mills Company, Rock Hill, S.C. "Regardless of our lower light bills, we have been repaid because our operators can do better work," reports L. D. Pitts, treasurer of the mills, which use a total of 200 lamps.

A shortage we all know is coming—

FACTORIES feel it and know what it means. It's the shortage of daylight that comes every fall.

Not like shortages of labor, raw materials or supplies, which develop without respect to season. Not a shortage which strikes us before we can act, but one that can be timed to the minute and dealt with before it appears.

Twenty-five per cent of all manufacturing is done under artificial light—and the three months of fall add nearly four hours of darkness that manufacturers can't afford to ignore. They know its effects on production, accident, labor—how relentlessly it increases costs.

This special industrial problem has been answered by twenty years of experience with specialized industrial light. It used to be known as Cooper Hewitt light, but now its name explains itself. It's Cooper Hewitt Work-Light.

Different, peculiar, better light. But most important of all, the right light for work—every hour of the day, every day of the year. It has earned the name Work-Light by demonstrating its fitness on all kinds of jobs.

Everything in its make-up fits the needs of a shop. No glare—none can exist in the 50-inch tube. No heavy, deep shadows—the tube diffuses light over, under and around. It's light that keeps eyes wide open, by eliminating hot, fatiguing red rays and evenly diffusing illumination 90 per cent composed of yellow-green—the seeing rays of light.

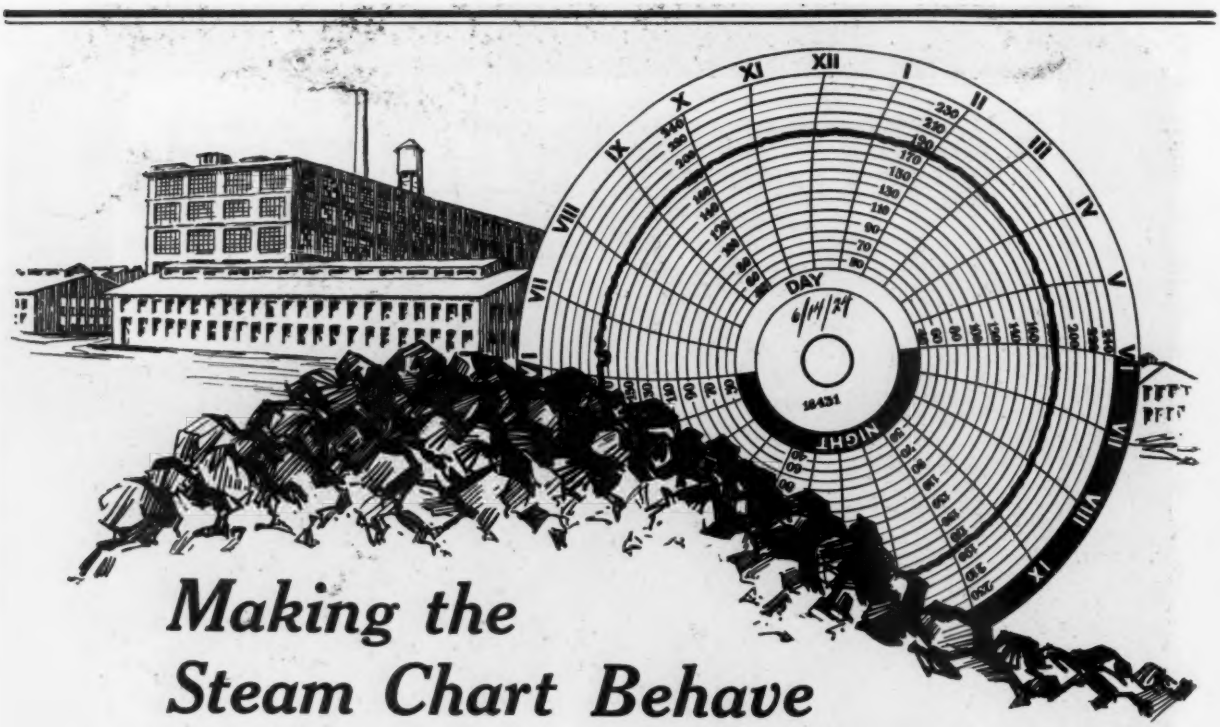
Go over your factory now. Where was it that production suffered most, according to your records for last winter and fall?

You'll find the Work-Light booklet a genuine help. Send for a copy today. Cooper Hewitt Electric Company, Hoboken, N. J.
89 River Street

COOPER HEWITT

Work-Light

34 © C. H. E. Co., 1924



Making the Steam Chart Behave

STONEGA

Steam and By-Product Coal

A great many steam charts develop bad attacks of "nerves" from a diet of fuels whose steam values are inconsistent and erratic.

RODA

Gas and By-Product Coal

The sure cure for this costly malady is found in the unvarying high quality "General" coals. A high quality made possible only by rich deposits, preparation and inspection.

Admiralty Coal

New River Smokeless

Our nearest office will gladly consult with you on your fuel problems and their remedy.

DEPENDABLE COAL

Finest Anthracite

GENERAL COAL COMPANY

1727 Land Title Building
PHILADELPHIA

BUNKER COAL

Supplied at
Baltimore, Md.
Charleston, S. C.
Jacksonville, Fla.
Newport News, Va.
Norfolk, Va.
Savannah, Ga.

BOSTON
CHARLESTON
CHARLOTTE
CINCINNATI

EXCLUSIVE SALES AGENT
—FOR—
STONEGA COKE & COAL CO.
HAZLE BROOK COAL CO.
—AND—
SUCCESSOR TO BUSINESS OF
WENTZ COMPANY

DETROIT
FAIRMONT
NEW YORK
NORFOLK

EXPORT & COASTWISE COAL

Loaded at
Baltimore, Md.
Charleston, S. C.
Newport News, Va.
Norfolk, Va.

Cotton

The Motor Way to Greater Production

Spinning and Twisting

A G-E Motor to Each Machine

There is no department in the cotton mill where the increased production, which results from the use of constant speed, is more important than the Spinning Room.

G-E Motors, individually applied to spinning frames, quickly show a gain in production from a given amount of machinery. The difference in production from frames individually driven by G-E Motors, as compared with mechanical drive, not only shows a marked increase—but a better and more uniform quality of yarn.

There is a complete line of special G-E Motors to meet all requirements of spinning and twister frames. These motors are built in sizes from 5 h.p. to 15 h.p., in several speeds, and for all standard voltages. Suitable G-E Control Devices can be supplied with all motors.

General Electric Company
Schenectady, N. Y.

GENERAL ELECTRIC

An Ideal Combination

LUNKENHEIMER

"Renewo and Ferrenewo"

Valves

FIG. 1021
"FERRENEWO"

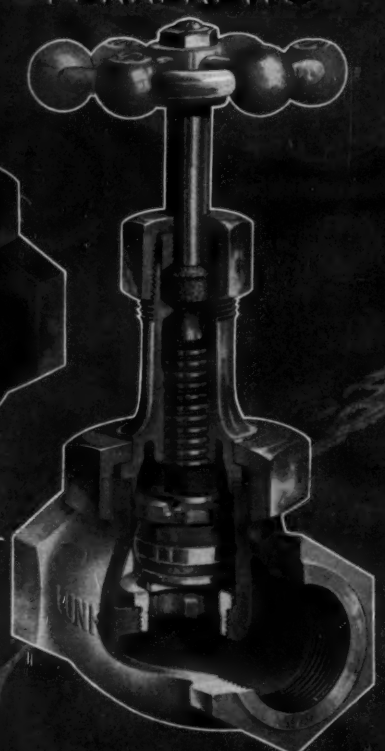
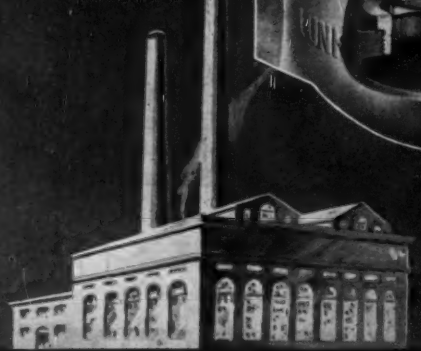


FIG. 73
"RENEWO"



Of the same design, with regrindable seating surfaces and all parts renewable, including the nickel seat and disc.

The "Renewo" with bronze body, suitable for the higher, and the "Ferrenewo" with iron body, (which is less expensive) for the lower pressures and temperatures, form a combination upon which many plants have advantageously standardized.

Both provide the same unexcelled efficiency with maximum economy of service, for the respective degree of pressures and temperatures for which they are warranted.

Booklets 535-567 A K afford complete information.

THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI

"America's Best since 1862"

102-31-10

because

—the motor is the very heart and soul of any electrically-driven machine. The best machine in the world will fail to function if the motor stops—and production will be interrupted. This simple fact is so obvious that it requires no proof.

To the discerning it is equally palpable that motors are not all alike simply because they all run. Automobiles and watches, for instance, are not alike because they all run.

Since the motor is the vital part of any machine, and since it is reasonable that all motors are not alike—*why not specify the motor?*

Because 12,000,000 horsepower of Westinghouse motors have proved themselves; because Westinghouse motors are made in more than 22,000 standard types, sizes and ratings to assure the right motor for any application; because Westinghouse motors, in any industrial center, can be reached over-night in case of need, by Westinghouse men—because of these facts discriminating users specify Westinghouse motors.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries

W
WESTINGHOUSE ELECTRIC

Westinghouse

Get the Most out of *all* your Equipment

—*with a Mathews System*

PUTTING in the right kind of conveying system is like writing an insurance policy to cover your whole investment in plant equipment — it is your assurance that materials will be brought to each machine or department, and away again, at exactly the right speed for profitable, efficient production.

A Mathews Conveyer System will link up your whole plan of production, permitting maximum returns from all the rest of your costly equipment; will effect a sharp cut in your handling costs, from the very start. The average installation will actually pay for itself in an astonishingly short time, out of the savings it earns for the business.

Executives who are seriously interested, are cordially invited to use Mathews' facilities and experience. We will gladly send an Engineer, qualified by practical contact with the Textile Industry, to go over your plant and make recommendations based upon his study there.

Write or wire for interesting particulars and for an appointment with a Mathews Engineer.

Mathews Conveyer Company

Formerly Mathews Gravity Carrier Co.

162 Tenth Street Ellwood City, Pa.

Branch Factory: Port Hope, Ont.

MATHEWS
Conveyer Systems

The BIG Achievement

A complete line of Oil Engines

Single Cylinder Horizontal Oil Engines
50, 100, 150 HP

Vertical, Multi-Cylinder Stationary Oil Engines
105 to 1000 HP

Vertical, Multi-Cylinder Marine Oil Engines
220 to 750 HP

Direct-Connected, Horizontal Oil Engine—Air and Gas Compressors

Direct-Connected, Horizontal Oil Engine—Ammonia Compressors

Send for illustrated Catalogs—

INGERSOLL-RAND 50 HP AND 100 HP STATIONARY OIL ENGINES

Simple, Rugged, Efficient, Reliable.

A small engine which makes for big savings.

Four cycle, horizontal, having direct-injection of fuel. Starts cold. No high pressure injection air compressor and piping. No hot bulbs or electrical ignition.

A small oil engine operating with full Diesel economy at any load. Burns any fuel oils that can be used in any Diesel engine. Burns *all* oil injected into cylinder—thus insuring *sustained* high over-all efficiency. No pulling of pistons, no scraping of valves, no needless wear.

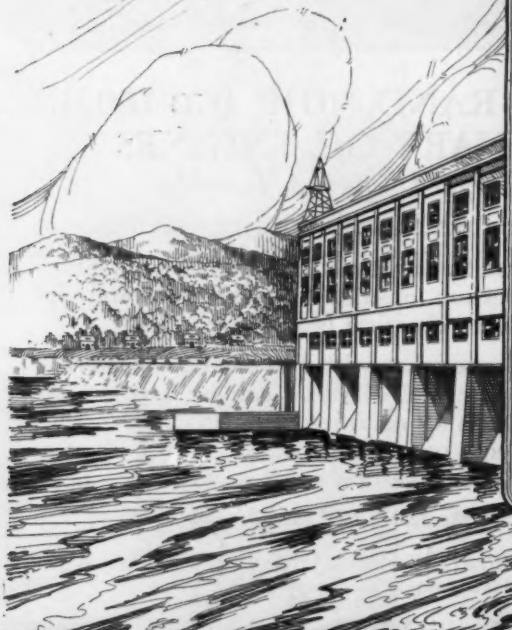
Let our engineers explain the details and convince you of the savings.

INGERSOLL-RAND COMPANY-11 BROADWAY, NEW YORK CITY.
Offices in all principal domestic and foreign cities

Ingersoll-Rand

Tennessee - The Heart of Industrial America

and the
SUPER-POWER
SYSTEM



Lower Your Power Costs— Increase Your Profits

Electric power in Tennessee has proved its advantages in hundreds of manufacturing establishments. In the textile field, in particular, its superiority over other types of drive has effected increases in the output of manufactured articles of from 10 to 20 per cent. Electric power in Tennessee can be purchased for less than the individual plant can make it. And the service is adequate, continuous and thoroughly reliable.

The accompanying map shows how completely the sections of Middle and East Tennessee are served by the superpower system of The Tennessee Electric Power Company. Over 1400 industries, operating in 80 cities and towns of the State, are electrically driven at costs as low or lower than in any other section east of the Mississippi River.

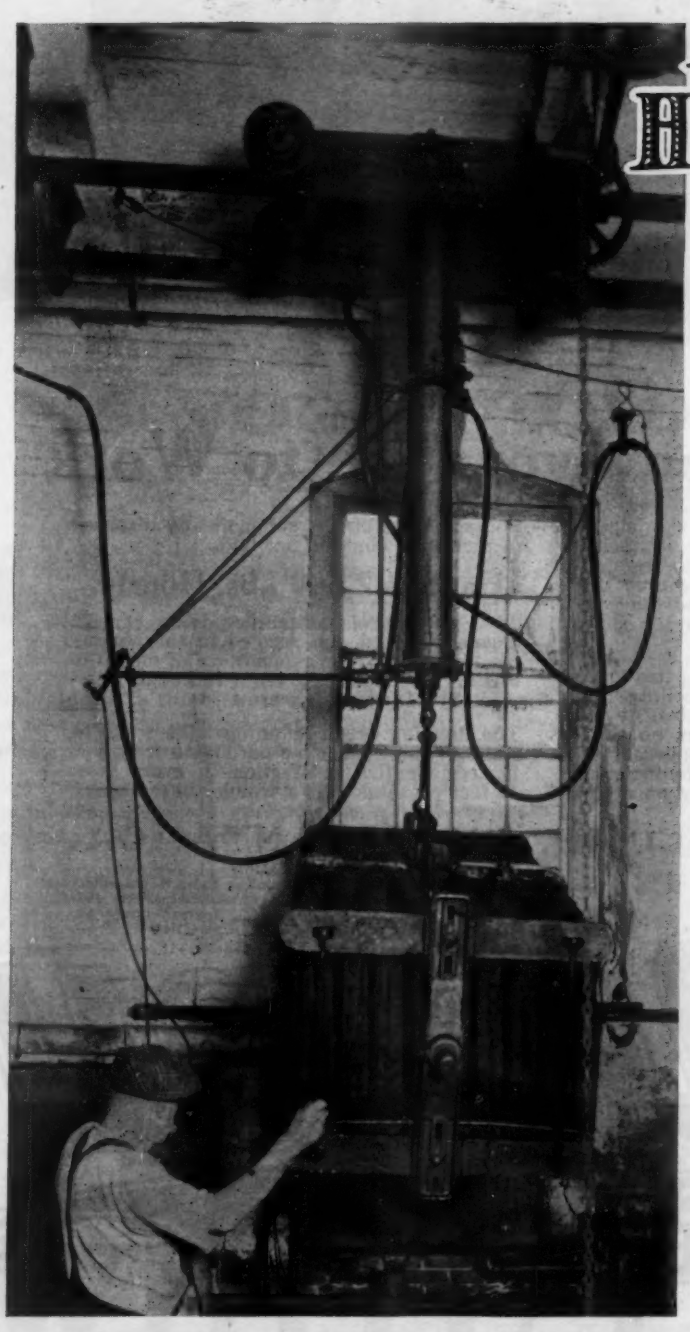
Tennessee has more than one hundred textile plants opportunities for the establishment of new mills. Write in successful operation today. And there are numerous us for complete information about this section.

Power to turn the wheels of industry is available in ample quantities in Tennessee. Textile manufacturers who locate in this section are not confronted with the problem of investing thousands of dollars in power plant equipment and construction. This capital is readily available for the installation of facilities for increased production.

THE TENNESSEE ELECTRIC POWER CO.
CHATTANOOGA, TENN.

The Tennessee Electric Power Co.

CURTIS AIR HOISTS



Used in The Textile Industry

Curtis one man All Steel Air Hoists and Curtis Roller Bearing Trolleys are effecting important economies in leading textile mills throughout the country.

Why not install a Curtis Air Hoist and operate it with the air you now have available? The wide variety of uses to which Curtis equipment can be most economically applied is worthy of your immediate investigation.

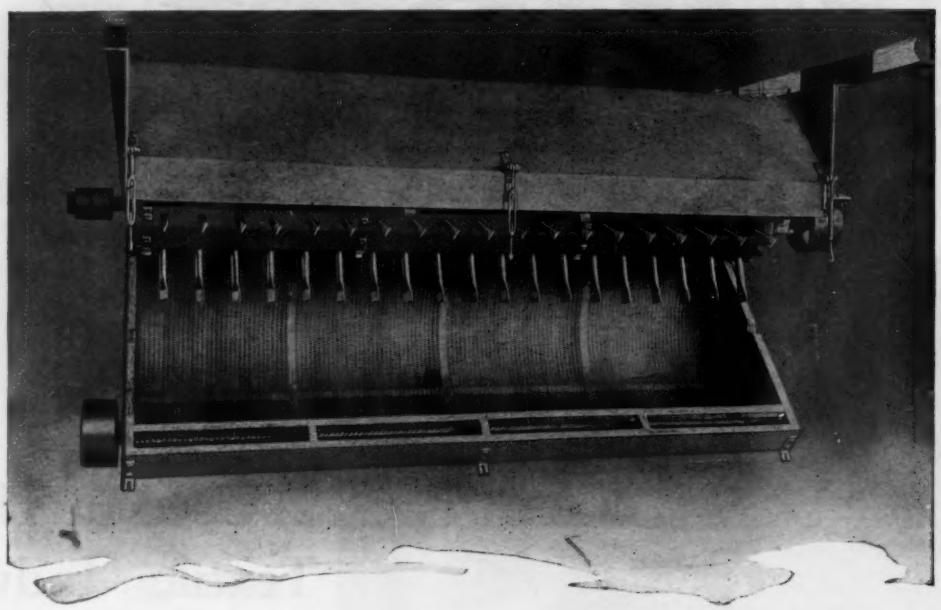
Curtis Pneumatic Machinery Company

1571 Kienlin Ave., St. Louis, Mo.

Branch Office

532-R Hudson Terminal, New York

CURTIS
AIR COMPRESSORS-HOISTS-TROLLEYS-CRANES
ST. LOUIS
Established 1854



Put Your Conveyor Pipe to Work

You can give your cotton a thorough cleaning, opening and aerating, while it's being conveyed from the bale breakers to the picker room. The Murray Cotton Cleaning and Aerating Machine forms a part of the conveyor pipe, and vastly improves the stock before it is fed to the pickers.

The "Murray" takes up very little extra space since it can be hung from the ceiling. Its supply of cotton is drawn through it by the suction of the conveyor pipe fan, no additional fan or increased draft being necessary. A further economical feature is the fact that the "Murray" requires practically no attention since the dirt is automatically disposed of through a chute at one end.

Handles 2,500 Lbs. Hourly.

2,500 pounds of cotton per hour can be cleaned, opened and aerated in the Murray machine at a power expenditure of only 3 to 5 H.P. The stock is given a thorough treatment by 114 revolving arms.

The Bowling Green Spinning Mills write us stating "The Opener we purchased from you is giving entire satisfaction in every way. In fact we think it is a wonderful machine."

THE MURRAY COMPANY, ATLANTA, GA.

Northern and New England Sales Representatives:
Aldrich Machine Works
P. O. Box 132, Providence, R. I.

Carolina Sales Representatives:
Carolina Specialty Co.
Brevard Court
Charlotte, N. C.

The Murray (PAT. PENDING)

COTTON CLEANING AND AERATING MACHINE

COTTON WELL OPENED IS HALF SPUN

Is your motor truck an orphan?

THERE are thousands of orphan trucks in the hands of owners. No distributor or dealer is interested in their deeds or misdeeds. No one is interested in healing their wounds. No redress is available to the owners for their shortcomings. No value is in them at resale. They cannot even be cast forth as charges on the community. They are soon junk—most of these thousands of orphans.

But there are other trucks — sound trucks, with sound makers—safe investments. And the facts to guide your selection are easily obtained.

There are thousands of White Trucks in the hands of owners. They are at work each day—all over the world. Ten, eleven, twelve years old—hundreds of them have traveled 100,000, 200,000, 300,000 miles and more. But even the oldest can still get attention — skilled and immediate — should misfortunes of the road stop their wheels. Old Whites and new go on paying dividends to their owners day after day by giving the most money-earning miles.

Assuring continuous, sustained transportation everywhere

You will not invest in a truck whose maker went out of business yesterday or last year. You should not invest your money in a truck whose maker is likely to go out of business tomorrow or next year.

The purchase of a White Truck is assurance of continuous, sustained transportation of your goods at low cost over the greatest number of miles and years. And The White Company will be in business tomorrow and next year and the next, as it has been during the past twenty-three years.

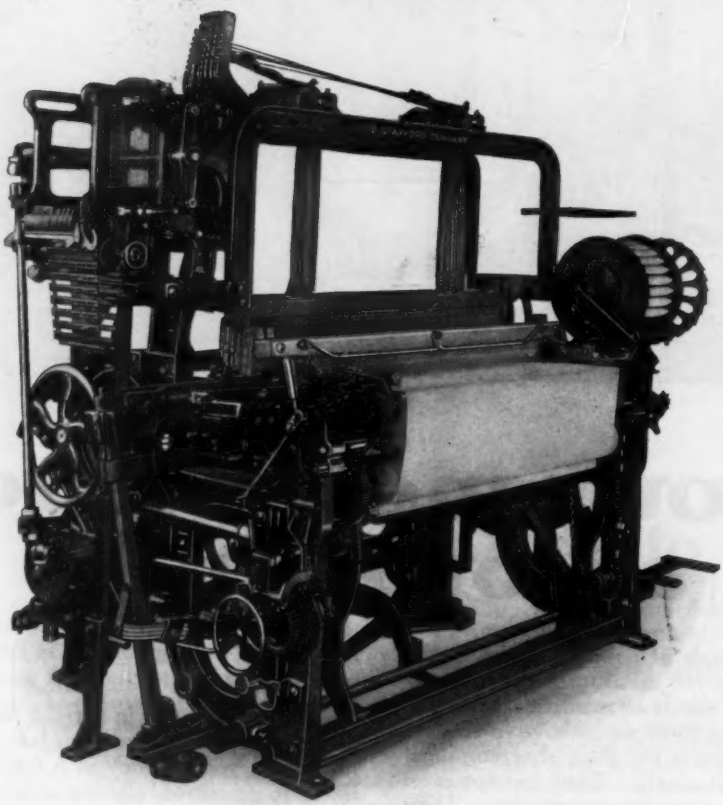
Keeping faith with its thousands of owners throughout those twenty-three years—boom years, war years, panic years—has made The White Company the most permanent factor in the motor truck industry.

No White Truck will ever be an orphan.

THE WHITE COMPANY, CLEVELAND

WHITE TRUCKS

STAFFORD
LOOMS



THERE is no better time than the present to make that investment in new looms.

Prepare now to take advantage of the good business that is to come.

Our facilities are at your disposal now and at all times.

THE STAFFORD COMPANY

Weaving Machinery

READVILLE, MASS.

STAFFORD

Southern Agent—Fred H. White, Charlotte, N. C.
Canadian Representatives—
Whitehead, Emmans, Ltd., Montreal, Canada.
Paterson Office—179 Ellison St., Paterson, N. J.

STAFFORD

Save half the labor in your spooling and warping department and you will reduce the cost per pound of your yarn an appreciable amount.

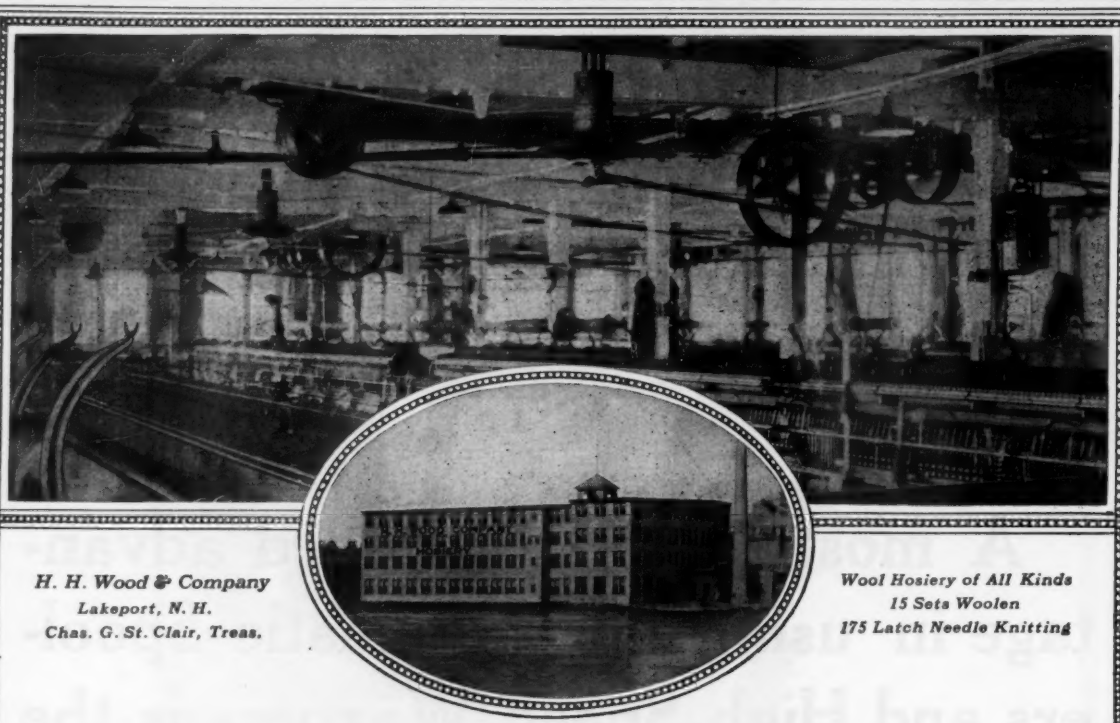
A most important added advantage in using our Automatic Spoolers and High Speed Warpers is the better warps they produce, resulting in better weaving and increased production.

"Every Knot a Weaver's Knot"

BARBER-COLMAN COMPANY

ROCKFORD, ILL.
U. S. A.

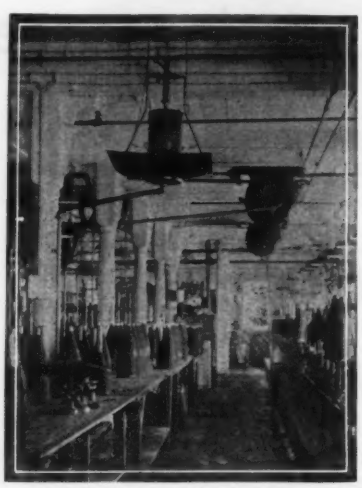
BOSTON, MASS. GREENVILLE, S. C.



H. H. Wood & Company
Lakeport, N. H.
Chas. G. St. Clair, Treas.

Wool Hosiery of All Kinds
15 Sets Woolen
175 Latch Needle Knitting

ParkSpray Humidifiers in Woolen Manufacture
Carding Mule Spinning Knitting



Humidifiers in Knitting Room

In this plant wool is carded, spun and knit. The Product is wool hosiery. ParkSpray humidifiers (with automatic regulators) have been installed in all these departments.

> "We are much pleased to advise you that the humidifier system which you installed is giving perfect satisfaction. It is a great benefit to us, and *worth much more than the price of installation.*"

IT HAS BEEN DONE. It is being done. ParkSpray Humidifiers help to solve problems in the carding and spinning of wool—not to mention the knitting of it.

Parks-Cramer Company
Engineers & Contractors
Industrial Piping and Air Conditioning
Fitchburg Boston Charlotte

Building With Foresight

A few years ago we were asked to recommend changes in a mill which would provide greater capacity for normal growth of the business.

Our knowledge of markets and the possibilities for selling this manufacturer's product showed immediate prospects for a greatly increased demand—greater even than this manufacturer had foreseen himself.

Our plans, therefore, not only provided for immediate need for more room, but allowed for future expansion as market conditions changed.

Lockwood-Green service meets requirements whatever they may be. We are prepared to do everything from the work of preliminary study of manufacturing requirements to the delivery of the finished plant.

The Lockwood-Greene organization is composed of men of broad business and financial as well as engineering training.

Our experience covers many years of textile engineering. Ask us to send you a copy of "Building with Foresight"—a booklet illustrating Lockwood-Greene work.

LOCKWOOD, GREENE & CO.
ENGINEERS

EXECUTIVE OFFICE, 24 Federal Street, BOSTON

BOSTON NEW YORK CHICAGO
DETROIT ATLANTA CLEVELAND CHARLOTTE SPARTANBURG

Lockwood, Greene & Co., of Canada, Limited, Montreal

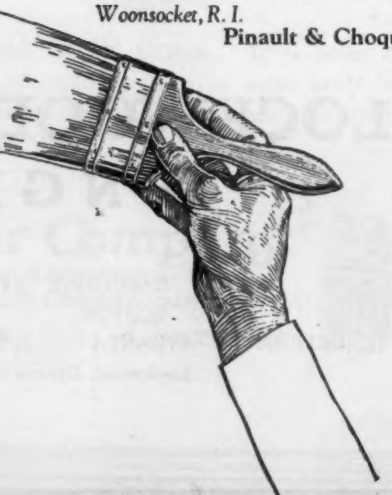
TRADE OJACO MARK

MILL WHITE

ECONOMICAL because of longer lasting Whiteness.

Repaintings are fewer and farther between

"Save the surface and you save all"— *Paint & Varnish*



DISTRIBUTORS:—

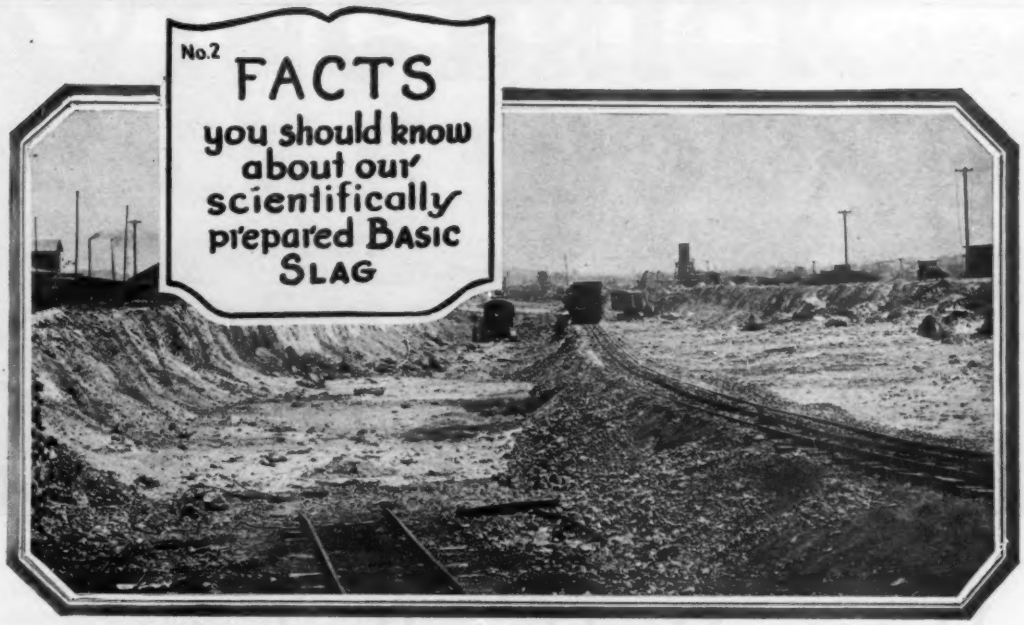
Boston, Mass. **Lewis E. Tracy Co.**
Charlotte, N. C. **Charlotte Supply Co.**
Columbia, S. C. **Columbia Paint Company, Inc.**
Fall River, Mass. **Wm. F. Harticon**
Greenville, S. C. **Frank R. Henry & Co.**
Holyoke, Mass. **J. Russell & Co.**
Rochester, N.Y. **E. P. Van Hosen Co.**
Syracuse, N. Y. **Paragon Plaster Co.**
Utica, N. Y. **American Hard Wall Plaster Co.**
Woonsocket, R. I. **Pinault & Choquette**

Oliver Johnson & Co., *Inc.*

Makers of Paints for all Industrial Purposes

18-24 Custom House Street

Providence, R. I.



To prolong the annealing process—and to make the Slag thicker and tougher—it is poured into Modified Pits

Under the old method, still used by a few producers, the Slag was poured over high banks and allowed to run down by gravity to a feather's edge. The thin strata cooled quickly and, when crushed, the Slag was too friable and there was an excessive percentage of flat, elongated pieces.

The modern scientific way of pouring slag into modified pits enables us to definitely control the thickness of the strata—and to prolong the cooling and annealing process.

How exactly d o e s t h a t improve the product?

When Slag is poured in thick strata, it breaks up in much more *cubical* pieces when excavated by the powerful electric shovels and run through the big gyratory crushers.

You steady users of slag "aggregate" know how important that is. Also you know from experience that when Slag is cooled slowly there is a marked increase in its solidity, toughness and strength.

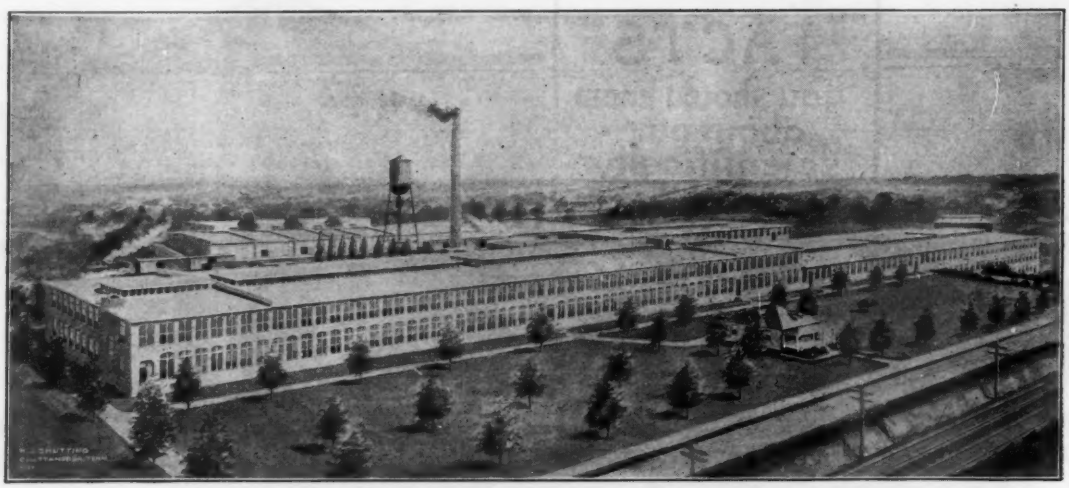
"What happens after the Slag leaves the modified pits" is the subject of our next statement. Watch for it!

Birmingham Slag Co.

Slag Headquarters for the South

ATLANTA **BIRMINGHAM** THOMASVILLE

The five modified pits are dry canals about 15 ft. deep and several thousand feet long. Photo shows our two big electric shovels excavating the slag from the pits and loading onto dump cars drawn by electric locomotives over a third rail system to the crushing plant.



The Dunson Mills at La Grange, Georgia, now in process of expansion

Dunson Doubling Production ~

AN enterprise that is forced to double its output, due to a constantly increasing demand for its products, may rightly be counted a success.

Such is the fortunate position of The Dunson Mills of La Grange, Georgia, makers of special ducks, osnaburgs, twills and drills for the manufacturing and converting trades.

Originally operating with 21,168 ring spindles, The Dunson Mills is now expending more than $1,000,000 in improvements. These improvements will include new brick and concrete buildings modernly equipped which will provide The Dunson Mills with 40,000 ring spindles, 10,000 twister spindles, 1,000 looms and other important special processes necessary for the manufacturing of their products.

This organization of Engineers was retained to plan and supervise the construction and equipment of the original plant as well as the recent expansion of The Dunson Mills.

The enormous and rapid growth of the Southern textile industry during the last two decades has called for our participation to a large extent in the vital problems of textile construction, equipment and production.

We shall be glad to place our practical experience of nearly a quarter century at your disposal and to confer with you on your plans for a new enterprise or for the sound expansion of an established business. Simply write for an appointment without obligation to you. You will also be interested in reading our new booklets, "Picks to the Minute," on the textile industry and "Factories for the Future."

J. E. SIRRINE & COMPANY

Engineers

Greenville South Carolina

SERVICE

PAVING BRICK and POCKETBOOKS

THE town, county or state that consistently paves with vitrified brick lightens the strain on every citizen's pocketbook for many years to come.

A properly-designed, well-built vitrified brick pavement can be counted on for a quarter-century or more of service at a minimum of repair and up-keep cost. Many communities are enjoying brick pavements laid thirty and thirty-five years ago and look forward to getting fifty years of service before they need replacement!

Profit by the experience, for instance, of Bucyrus, O., where Walnut Street, a main traffic route, is still paved with the brick originally laid in 1891, 33 years ago, and relaid in 1922, *other side up,* for another generation of service. Or of Clinton, Iowa, which has yet to need a major repair for brick-paved Seventh Avenue, between 2nd and 5th Streets, laid 32 years ago.

Do you know of any other pavement at a comparable cost which can hope to equal these records? Is there a pavement, *other than brick,* in *your* locality which can show any such record?

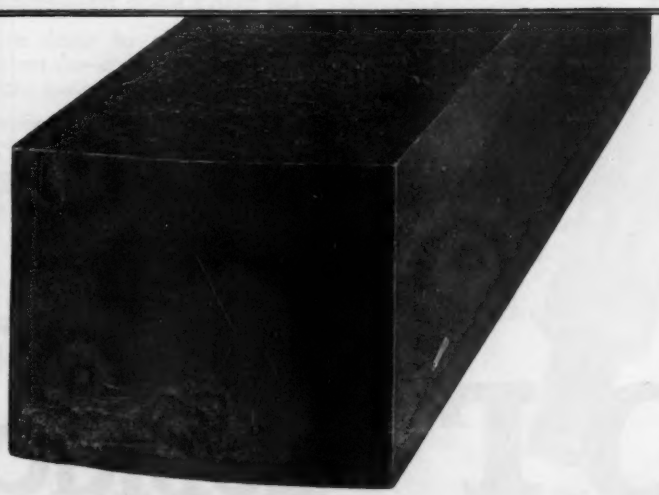
VITRIFIED Brick PAVEMENTS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION
ENGINEERS BLDG. CLEVELAND, OHIO

Be Led by Experience—

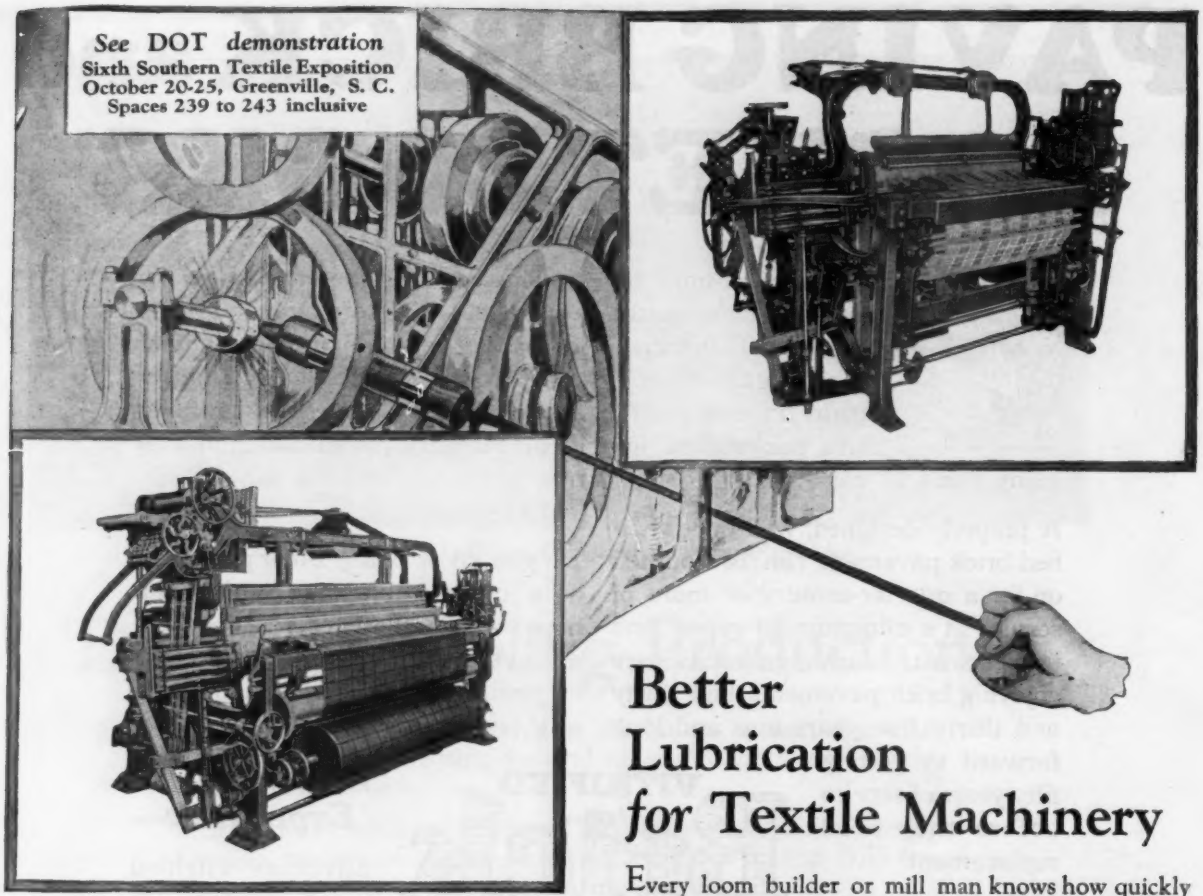
advocate vitrified brick pavements and keep taxes down. Get the pavement that *outlasts the bonds.*

OUTLAST THE BONDS



Alton Brick Company, Alton, Ill.
Binghamton Brick Company, Binghamton, N. Y.
Cleveland Brick & Clay Company, Cleveland, Ohio
Clydesdale Brick & Stone Co., Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co., Coffeyville, Kans.
Collinwood Shale Brick Company, Cleveland, Ohio
Francis Vitric Brick Company, Boynton, Okla.
Georgia Vitrified Brick & Clay Co., Augusta, Ga.
Globe Brick Company, East Liverpool, Ohio
Hisylvania Coal Co., Columbus, Ohio
Hocking Valley Brick Company, Columbus, Ohio
Independence Paving Brick Co., Independence, Kans.
Metropolis Paving Brick Co., Pittsburg, Kansas
Metropolitan Paving Brick Co., Canton, Ohio
Mineral Wells Paving Brick Co., Mineral Wells, Texas
Moberly Paving Brick Company, Moberly, Mo.
Murphysboro Paving Brick Co., Murphysboro, Ill.
Nelsonville Brick Co., Nelsonville, Ohio
Peebles Paving Brick Company, Portsmouth, Ohio
Purington Paving Brick Company, Galesburg, Ill.
Southern Clay Mfg. Company, Chattanooga, Tenn.
Springfield Paving Brick Company, Springfield, Ill.
Sterling Brick Company, Olean, N. Y.
Streator Clay Mfg. Company, Streator, Ill.
Thurber Brick Company, Ft. Worth, Texas
Toronto Fire Clay Company, Toronto, Ohio
Trinidad Brick & Tile Company, Trinidad, Colo.
Veedersburg Paver Company, Veedersburg, Ind.
Western Shale Products Company, Fort Scott, Kans.
Westport Paving Brick Company, Baltimore, Md.

See DOT *demonstration*
Sixth Southern Textile Exposition
October 20-25, Greenville, S. C.
Spaces 239 to 243 inclusive



Better Lubrication *for* Textile Machinery

Every loom builder or mill man knows how quickly certain parts of a loom wear out through lack of lubrication. The cost of replacing rocker shaft boxes, cam shaft boxes and remote bearings that cannot be properly lubricated is alarming.

These costly replacements can be eliminated by the use of the DOT System. Every part, no matter how inaccessible, can be quickly and easily reached even when the loom is in operation, while the positive pressure of more than 3,000 pounds forces the lubricant directly to the bearing.

The powerful, almost indestructible DOT can be installed on your looms at a surprisingly small cost—less than a single replacement of a worn out part.

Builders of textile machinery can insure that after-the-sale performance by equipping their machines with the DOT System.

May we show you how quickly and thoroughly the DOT will lubricate your machines?

THE WALRAVEN COMPANY
38 WEST ALABAMA ST., ATLANTA, GA.

The DOT Lubricator is thoroughly protected by allowed claims of pending patent applications.

DOT TRADE MARK

high pressure LUBRICATOR

BOWSER ESTABLISHED 1885

Any textile mill that wants to handle oils *with extreme economy* should look into Bowser outfits 60 and 61.

One is a standard 25-gallon welded tank on which is mounted a self-measuring pump; the other is a combination of two of the tanks mounted on one tank cart.

For inside service buy the unmounted tanks; for service at the curb, get the complete cart with the two tanks, each with its own self-measuring pump.

All the outfits are of standard Bowser construction and standard Bowser material, and are guaranteed satisfactory.

This outfit is extremely economical in price, is built to stand rough usage, and immediate shipment can be made from warehouse stock.

For details, address Dept. 45

S.F. BOWSER & COMPANY, Inc.
Dependable Pumps and Tanks
FORT WAYNE, INDIANA, U.S.A.
Sales and Service Representatives All Over The World

MORSE SILENT CHAIN DRIVES

Morse Silent Chain Drive in a Southern textile mill.

Keeping the work clean and up to standard

With Morse Silent Chain Drives, there is no fly and dirt from pulleys and belts to get into the yarn.

Morse Chains transmit 98.6% of the motor power, permit close centers, have long life, require little attention beyond occasional lubrication, do not slip, sway or stretch, and run quiet, clean and cool.

This advantage, together with the uniform, steady transmission of power for which Morse Chains are well known, insures a high quality product which textile mills demand.

One mill (name on request), typical of hundreds of others, reports as follows: "We have our first complaint to receive on our yarn, the same being used by some of the largest and best mills in the country. My object in bringing this before you is to show how superior such a drive (Morse Silent Chain) is over the belt from the standpoint of fly and dirt from the pulleys and belts getting into the work and causing the customer to complain of slugs, etc."

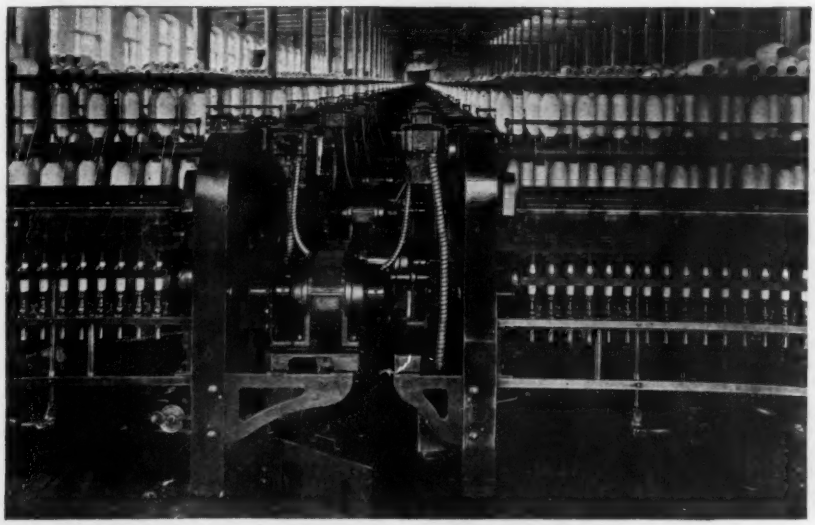
Let Morse Engineers cooperate with you.

MORSE CHAIN CO., ITHACA, N. Y.

There is a Morse Engineer near you

ATLANTA, GA...702 Candler Bldg., Earl F. Scott & Co.
BALTIMORE, MD.....1402 Lexington Bldg.
BOSTON, MASS.....141 Milk Street
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....Room 803, 112 W. Adams St.
CLEVELAND, OHIO.....421 Engineers Bldg.
DENVER, COLO.....1761 Wazee St., R. M. Parsons
DETROIT, MICH.....7601 Central Ave.
NEW YORK CITY.....Room 1871, 50 Church St.
MINNEAPOLIS, MINN.
413 Third Street, S., Strong-Scott Mfg. Co.
PHILADELPHIA, PA.....612 Franklin Trust Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
SAN FRANCISCO, CAL.....Monadnock Bldg.
ST. LOUIS, MO. Railway Exchange Bldg., Morse Chain Co.
WINNIPEG, MAN., CAN.
Dufferin St., Strong-Scott Mfg. Co.

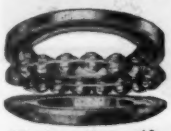
2154-30



Obtain full value of chain drives on spinning frames with Strom Ball Bearings

Double-acting thrust bearing, flat seats (grooved races) 2100-F Series

Single-acting thrust bearing, flat seats (grooved races) 1100-F Series



Single-acting, self-aligning thrust bearing 1100 Series

Single-acting, self-aligning thrust bearing, leveling washer. 1100-U Series

Double-acting, self-aligning thrust bearing, leveling washers 2100-U Series

Chain drives are now the accepted standard for spinning frames.

The full value of chain drives cannot be obtained with sliding friction bearings because: Plain bearings wear rapidly. They require frequent and excessive oiling. When worn they cause vibration. They require frequent repairs with attendant shut downs. They throw oil. They allow the sprockets to get out of line.

Strom Ball bearings save 95% of the oil required for plain bearings as they require lubrication only once in 3 or 4 months and throw no oil. Shut downs are avoided and maintenance costs reduced, as they last for years and need not be replaced.

They maintain permanent alignment of the sprockets, increasing the efficiency and life of the chain drive.

Strom Ball Bearings can be applied at moderate cost when you are equipping your old spinning frames with chain drives.

Specify Strom Ball Bearings when buying new frames or apply them yourself in boxes made to fit your old frame when modernizing your drives.

For further information on textile applications write the Aldrich Machine Works, Greenwood, S. C.

Single-row deep-groove Standard type, radial bearing

Double-row, deep-groove Standard type, radial bearing

Angular contact bearing, combination radial and thrust

Double-row, maximum type, radial bearing

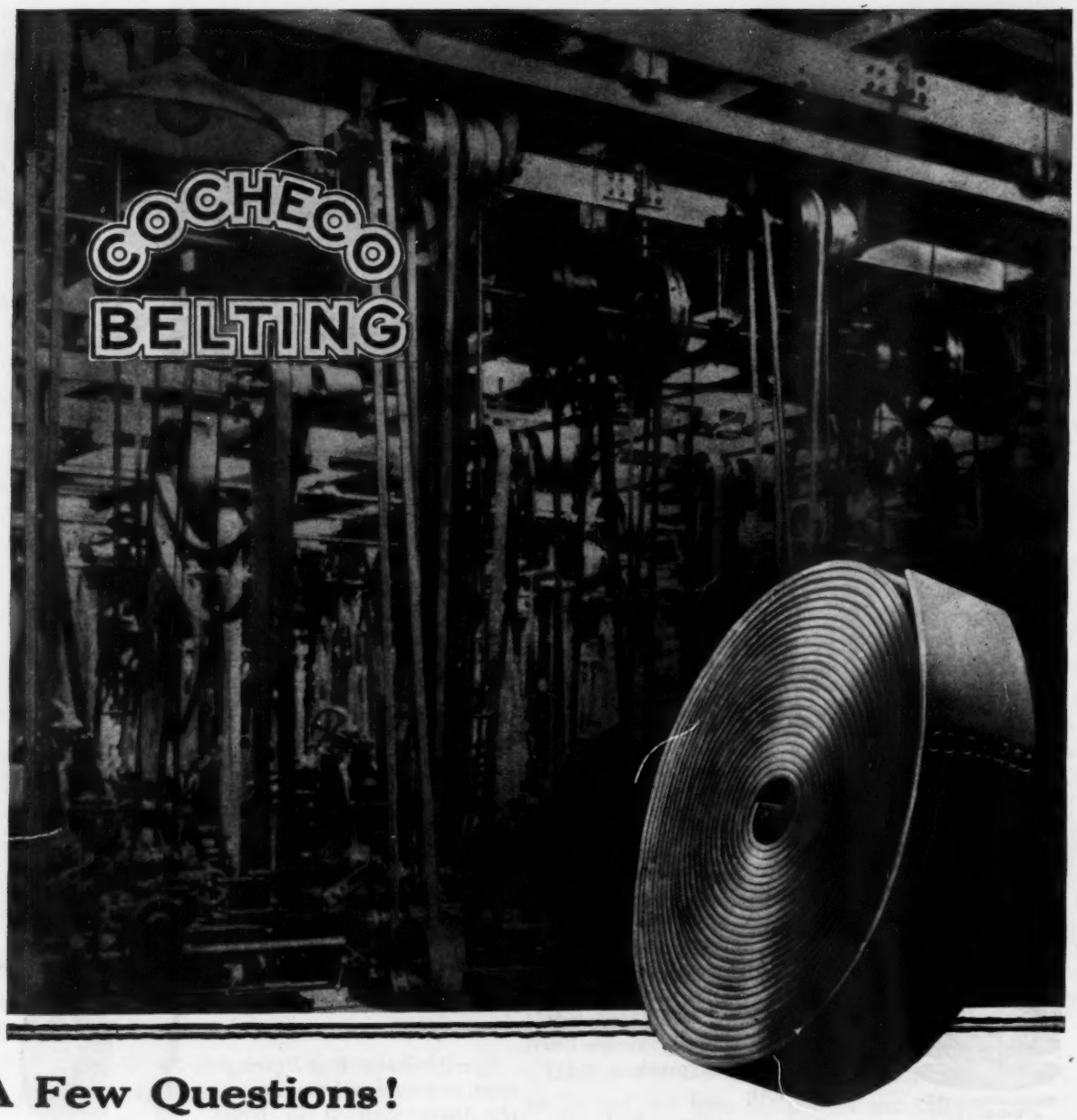
Single-row, maximum type, radial bearing

Strom BALL BEARINGS

STROM BALL BEARING MFG. CO.

Formerly U. S. Ball Bearing Mfg. Co.

4544 Palmer Street, Chicago, Ill.



A Few Questions!

How efficient is your power transmission medium?

Do you get full production from the power you buy?

Do you know how to detect a power leakage in transmission?

Check up on these details and you'll have some interesting information on an important though frequently neglected phase of manufacturing costs.

We'll be glad to help you make your survey and tell you of the results obtained in the use of Cocheco Belting during eighty-three years.

Cocheco Oak Tanned Leather Belting is serviceable, durable and economical. Let us tell you about it.

I. B. WILLIAMS & SONS, Dover, New Hampshire, U. S. A.

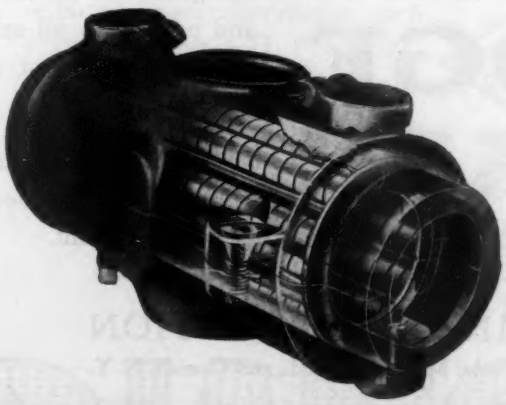
14-16 N. Franklin St., Chicago, Ill. 157 Summer St., Boston, Mass. 71-73 Murray St., New York, N. Y.

Price (The initial outlay) and Cost (Price, plus all items of maintenance, minus savings effected)

PLAIN line shaft bearings naturally sell at a price lower than Hyatt roller bearings, but the most superficial analysis will show that their cost is much higher.

Hyatt bearings require no maintenance, and their easy turning yields a saving of at least 15% of the total power transmitted, together with a saving of 85% in lubrication costs.

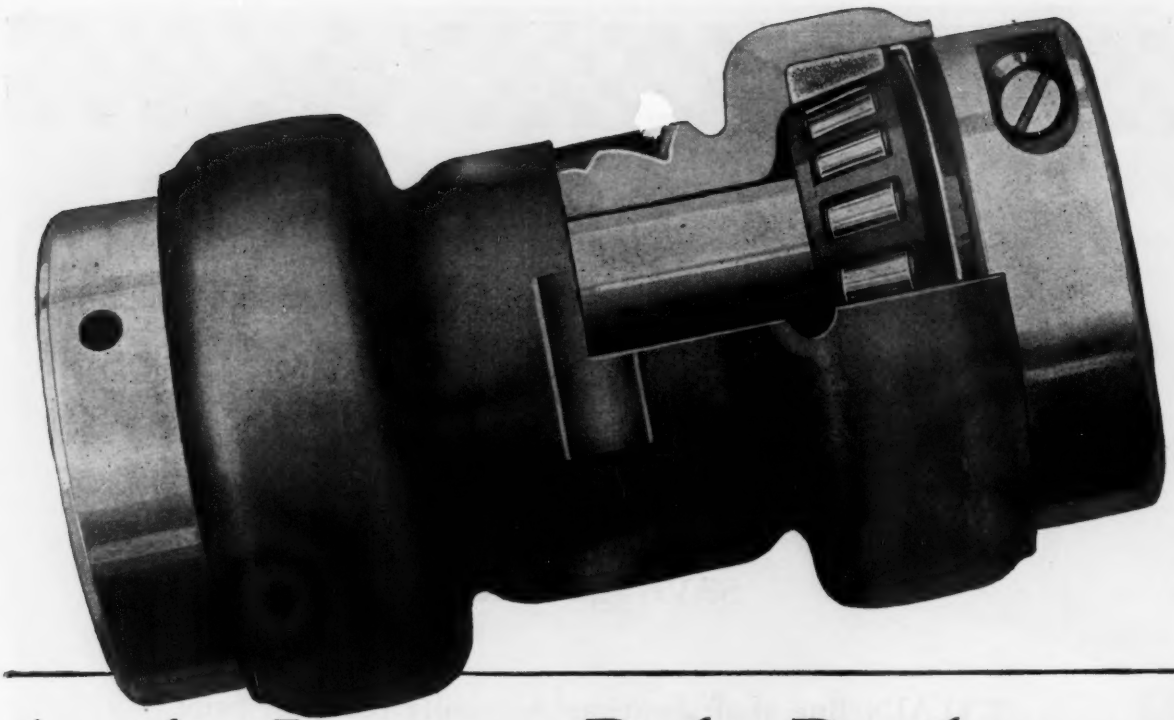
Consider these facts when equipping your plant. Engineering bulletin No. 130 tells the complete story and contains information of interest about power transmission. Write for a copy.



'Phone the Nearest Mill Supply Dealer

HYATT ROLLER BEARING COMPANY
NEWARK, NEW JERSEY
PACIFIC COAST ADDRESS: SAN FRANCISCO, CAL.

HYATT LINE SHAFT ROLLER BEARINGS



Another Important Dodge Development

FOR many years Dodge engineers have watched the evolution of ball and roller bearings. It was only after one hundred and ten million Timken Tapered roller bearings had been made, sold and thoroughly proved their right to pre-eminence in their field that they were adopted as worthy to be built into a product bearing the Dodge trade-mark and endorsement.

The Dodge-Timken Roller Hanger Bearing is first of all a rugged bearing, fully capable of continuously withstanding the shock loads encountered in power transmitting service.

Simplicity, interchangeability, long life and trouble-free lubrication are other outstanding features of this new Dodge product.

There are only five parts in the complete assembly. The housings are interchangeable in all Dodge and practically all other types of drop, post and bracket hangers.

Write for full information about this new Dodge power-saving unit.

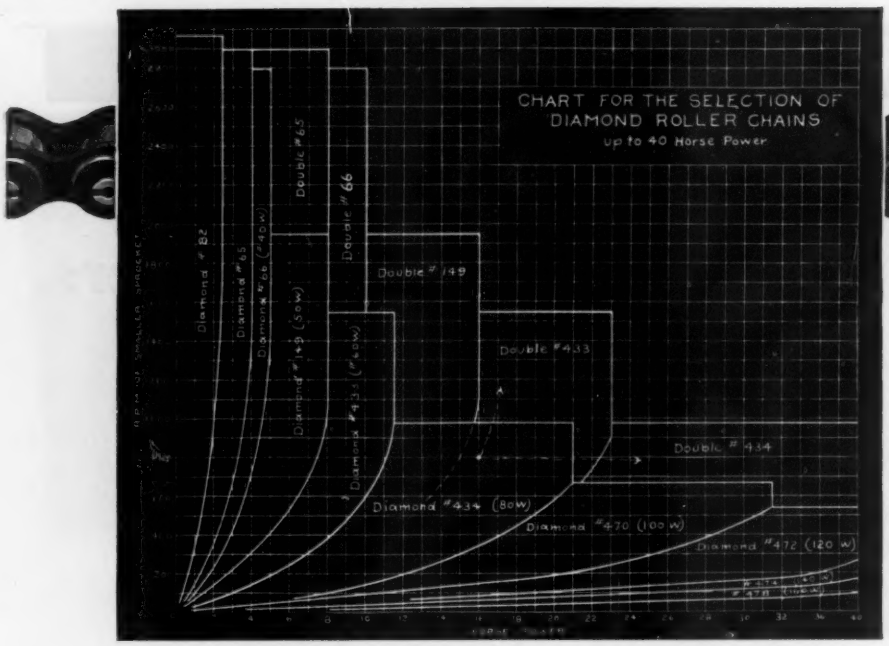
DODGE TIMKEN
ROLLER HANGER BEARING

DODGE MANUFACTURING CORPORATION

General Offices: Mishawaka, Ind. *Works:* Mishawaka, Ind., and Oneida, N. Y.

EVERYTHING FOR THE MECHANICAL TRANSMISSION OF Power

Branches: New York, Philadelphia, Pittsburgh, Boston, Cincinnati, Newark, Chicago, Atlanta, Minneapolis, St. Louis, Houston, Portland, Seattle, San Francisco



Do You Know the Maximum Speeds

at which DIAMOND Roller Chains will transmit power?

THE CHART ABOVE shows the speed and power capacities of each model of Diamond Roller Chains. It is based on the results of many years' satisfactory service in practically every important industry.

For performance is the only true test. As an example, here is the record of 130 Diamond No.66 single roller chains, each transmitting 1 H. P. at 1600 R. P. M., in one mill.

These chain drives have given the equivalent of 7 years and 10 days of eight-hour day trouble-free service, within a period of 3 years and 8 months, and are still capable of several more years of perfect service.

The results reported from the use of these drives are; an improved product, increased production, saving of power, reduced bearing maintenance.

Reasonable first cost and low upkeep, added to such service, gives the combination of savings and advantages made possible by the use of Diamond Roller Chains.

Catalog and data sheets, including a large chart like that above, sent on request. Use the coupon.

DIAMOND CHAIN & MFG. CO. Indianapolis, U.S.A.

Makers of High Grade TRADE MARK *Chains Since 1890*

DIAMOND
Roller Chains

Diamond Chain & Mfg. Co.
Indianapolis, Ind., U.S.A

Gentlemen; C-9

Mail me your Catalog and Data Sheets on Roller Chain Drives.

Name.....

Position.....

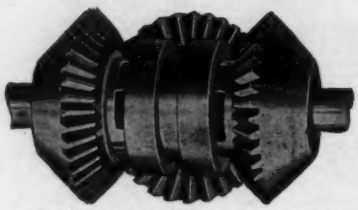
Firm.....

Address.....

THE JOHNSON FRICTION CLUTCH

Johnson Clutches Are Used On Butterworth Dyeing Jiggers.

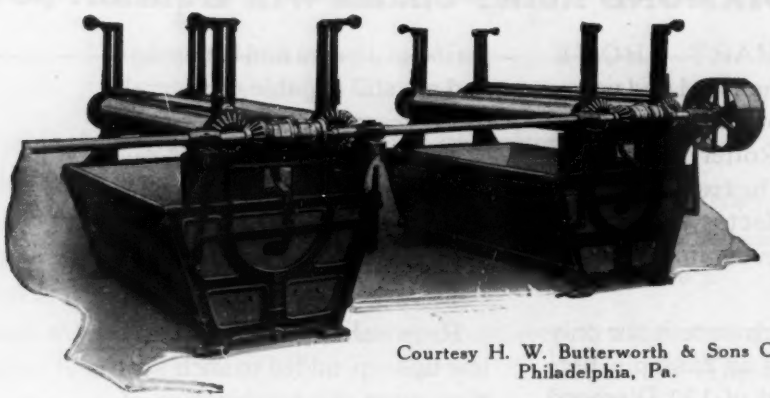
Johnsons are giving splendid service on Butterworth machines all over the country.



Double Clutch Between Bevel Gears

When a firm like H. W. Butterworth & Sons Company chose Johnson clutches there's a reason.

Equip Your Textile Machines With Johnson Friction Clutches



Courtesy H. W. Butterworth & Sons Co. Philadelphia, Pa.

All over America the name of Butterworth is known. It stands for reliability and sound judgment. When Butterworth adopted Johnson Friction Clutches for their Dyeing Jiggers they placed on these Clutches the stamp of approval from one of the oldest and most respected textile machinery building firms in the United States. As we serve them, let us serve YOU.

Lucky is the plant that gets Butterworth Dyeing Jiggers with Johnson Clutches. The clutches guarantee perfect control. They start and stop the machine instantly. They are powerful, durable, and never jerk or grab. Many drives in the dye house need Johnsons. In fact, Johnsons improve all textile machines. We design clutches to meet any requirement. Write us.

Write for our Catalog G

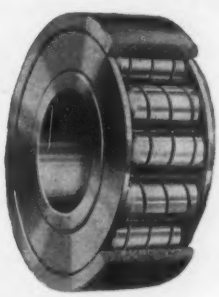
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

The New Hyatt Textile Bulletin

CONSIDERABLE interest has been aroused by the new 50 page engineering bulletin dealing with Hyatt roller bearings for Textile Machinery.

This bulletin not only explains fully the advantages derived from the use of Hyatt bearings in textile machinery but contains additional information of interest and value to the machinery user and manufacturer. It is fully illustrated with photographs and detail drawings.

We want every person interested in textile manufacture to have a copy of this bulletin. Write for yours now.

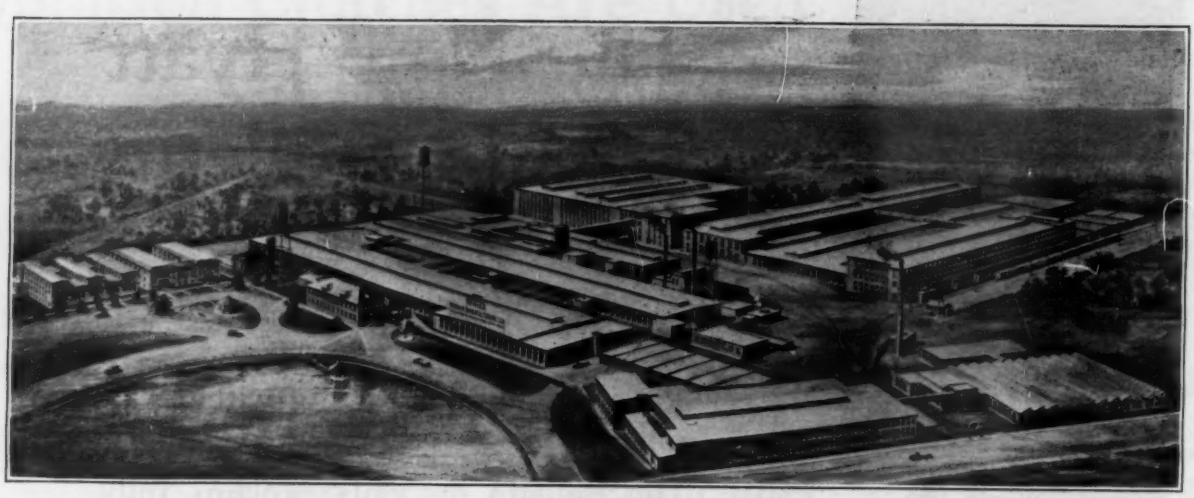


HYATT ROLLER BEARING COMPANY

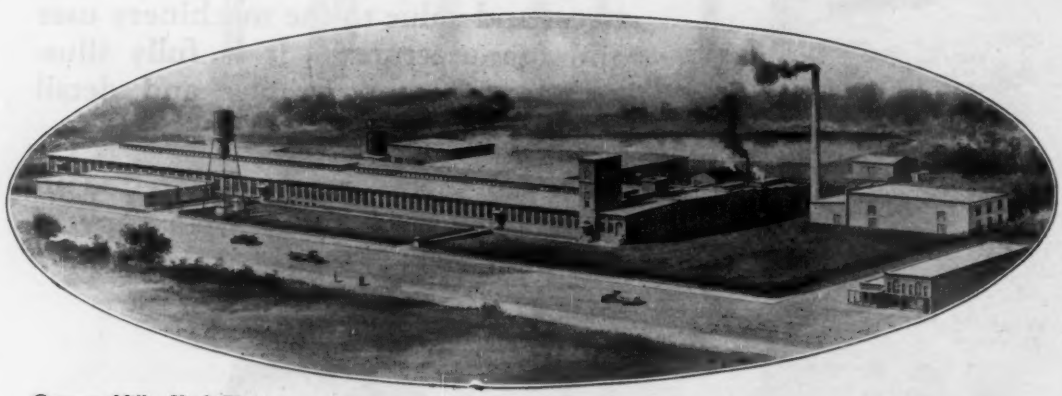
NEWARK DETROIT CHICAGO SAN FRANCISCO
WORCESTER PHILADELPHIA PITTSBURGH
CLEVELAND MILWAUKEE

HYATT ROLLER BEARINGS FOR TEXTILE MACHINERY

IN THE CANNON MILLS



Cannon Mills, Kannapolis, N. C.



Cannon Mills, York Plant

BUTTERWORTH

the largest towel working plant in the world

One Dozen Cannon Towels are Finished Every Second on Butterworth Machinery

Perhaps the following facts and figures will help in acquiring a mental picture which will give you an idea of the greatness of the output of the Cannon Mills at Kannapolis, N. C.

The yearly finished product of these mills would fill a freight train 12 miles long of about 1,800 cars, each car carrying 15,000 pounds of towels.

To supply the material for which these towels are made, the Cannon Company spins 20 miles of yarn per second—enough to encircle the world 30 times every working day. To produce the raw cotton used in spinning this yarn requires the entire crop of 4,000 fifty-acre farms.

The yarn, all used in Cannon Towels, would reach 200,000,000 miles or to the sun and back.

The towels, if sewed end to end, would form a band 75,000 miles in length or enough to belt the earth three times.

Finally, enough towels bearing this trade mark TRADE MARK CANNON are made every year in the Cannon Mills and *finished on Butterworth Machinery* to supply a towel to every man, woman and child in the United States.

We are glad that Butterworth Machinery has a part in this gigantic production. Proof of how well and how efficiently this machinery has performed under all conditions is in the fact that as the Cannon Manufacturing Company has grown, more and more Butterworth Machines have been added, until today they are being used in producing fifty different finishes.

H. W. BUTTERWORTH & SONS CO.

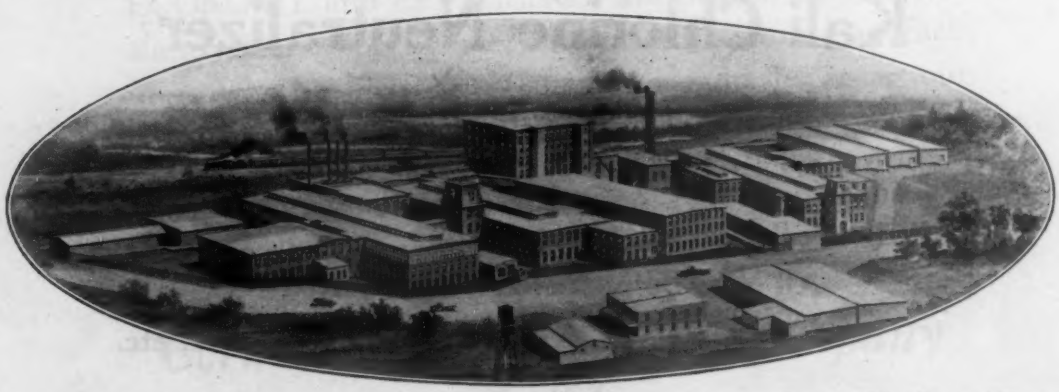
Established 1820

PHILADELPHIA, PA.

Providence Office: Turks Head Building

Canadian Representative: Hamilton, Ontario, Canada W. J. Westaway Company

Woodside Building Greenville, S. C., Office:



Cannon Mills, Concord Plant

Finishing MACHINERY

Hydroxy Art Silk Coning Oil

A Specially Prepared Oil

Used in the Coning, Winding, and Knitting of Artificial Silk

Makes Artificial Silk Knit Smoothly.
Eliminates Breakdowns. Reduces Seconds.
Washes out easily at low temperature.

Therefore—

Dyeing and Bleaching is even and shades brighter.

Sample sent on request—no charge.

Developene (There Is no "Just as Good")

Makes a rusty Black stocking turn deep Black.

Kali Chlorine Neutralizer

An Anti-chlor—prevents tender bleached goods.

All chemicals for the Dye House—
All oils—Sulphonated—Turkey Red—
Neatsfoot, Olive, etc.

KALI MANUFACTURING CO.

1410 No. Front St., Philadelphia, Pa.

Sole Manufacturers of "Hydroxy Oils" Patented.

Starch

EAGLE

400 MILL
500 MILL

FAMOUS N
C. P. SPECIAL

Blue River Crystal

These STARCHES are manufactured by carefully controlled and standardized methods.

PURITY and UNIFORMITY are secured by accurate laboratory tests.

ECONOMY and EFFICIENCY are proven by the constantly increasing number of exacting cotton manufacturers who are getting satisfactory results by using our STARCHES especially selected for their conditions.

Recommendations are based upon intelligent investigation of each individual problem.

Corn Products Refining Company

New York

Southern Office *Greenville, S. C.*

Starch

AT THE MADE-IN-CAROLINAS EXPOSITION

Textile manufacturers, mill men, and dyers who attend the Fourth Annual Made-in-Carolinas Exposition to be held in Charlotte, N. C., from September 22nd to October 4th are invited to visit the National Booth in Spaces 128 and 129.

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COTTON

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MATHIESON Chemicals

Are You Contributing to This Economic Waste?

MANY large consumers of caustic soda are neglecting their own best interests and contributing to a needless economic waste by continuing to use solid caustic instead of the modern development—caustic soda in liquid form.

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With the Publishers—

We Supply "Baby Chick" Ideas—You Promote Them

Lots of poultrymen are raising chickens without owning incubators or setting hens; the baby chick business has grown to be an industry in itself. All over the country are big hatcheries which incubate the eggs and when the fluffy little youngsters are a day or two old ship them out to people who raise them to maturity.

COTTON sends out lots of baby chicks in the form of ideas that are raised to maturity by mill men.

In fact, COTTON has proved to be a pretty good sort of a hatchery for baby ideas that grow up into healthy plans for increasing production and getting more profits in the mills, and more pay in the pockets.

Like any other hatchery there is a lot in selected stock and the ideas that COTTON chooses for hatching are tested for "fertility" and come from the best "flocks" in the textile world.

You know that the poultrymen must give the baby chicks proper attention if they are to be developed so they will bring him a profit. The same thing is true of the healthy young ideas sent to you by COTTON. Not all chickens require the same diet or thrive in the same surroundings. Therefore, a "baby-chick" idea to grow up into profits in your mill may need a little change. You will have to study it and get it thoroughly adapted to its new home and conditions.

Textile men know that chickens do not thrive without the proper food and that the successful poultrymen of today have profited by using devices that were unheard of a few years ago. They study their poultry papers for better methods and equipment.

In developing the "baby chick" idea of textile practice as supplied by COTTON, the advertising pages are invaluable. Each issue deserves a thorough reading because an advertisement may offer the equipment or supplies which will solve a problem that has arisen with you since the last number. COTTON'S advertisers keep apace with the production problems in the textile field and you are likely at any time to run across something that has helped another mill man to raise an idea to maturity.

Of course COTTON presents to its readers many full-grown plans in textile practice but the sending out of "baby chicks," which the superintendent alone can develop in his own way, is also an important part of its work.

The department entitled "How Other Men Manage" and the section devoted to "Knitting Kinks" are but two of the baskets containing these "budding biddies," but they will serve as examples for a quick "look see."

Then tackle the more pretentious articles. Your honest efforts will be repaid in eggs.

AMONG COTTON'S READERS

J. L. Ivers, Superintendent

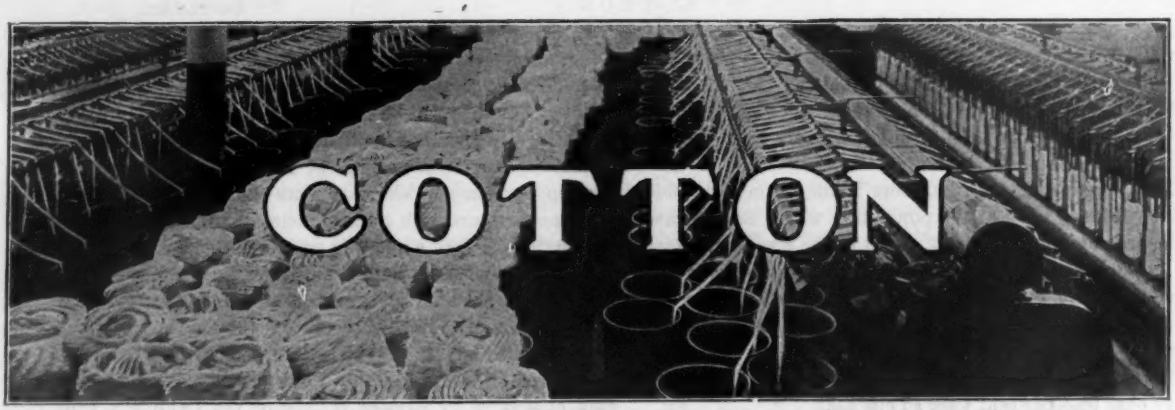
Mill No. 6

Renfrew Manufacturing Company

Adams, Mass.

"I have been a constant reader of COTTON for the past ten years. I have been cutting out of it some very valuable information and filing it away in my library under the proper heading. I expect to hand this collection down to my son, who is attending textile school at present. We use articles in the "How Other Men Manage" Department as a basis for discussion at our weekly group conferences of overseers, and find them highly valuable."

J. L. Ivers



September, Nineteen-Twenty-Four

Agriculture "Comes Back."

Farming which was hit first and perhaps hardest by post-war deflation is now, it seems, definitely on the upturn throughout the country.

Wheat, which for the last two years has been the chief symbol of agricultural distress, bids fair to sell at a price equal to if not above its pre-war "buying power." This despite the fact, that the yield per acre and for the country as a whole is large.

Corn, too, has sold recently at a price above the "dollar-a-bushel" figure which in the past has meant solid prosperity for its growers. The yield, however, is not as large as the average for recent years.

Cotton, too, is bringing "good prices," though the yield is still curbed by the boll weevil; yet promising to be larger than usual this year.

Most other farm products are bringing better prices than prevailed during the last two or three years and yields in most cases are good.

The Department of Agriculture estimates that the wheat farmers alone are receiving several hundred million dollars more for one product than they got last year. All told, the farmers of the country will probably realize several billion dollars more for this year's labor than was received for last year's.

On August 1, the Department of Agriculture stated that the index purchasing power of farm products in June was ten points higher than for any other June in four years, with the rise still underway.

This condition should be assuring for the future. Its development also should be a warning to the farmers against extreme proposals for their relief which always develop during periods of agricultural depression.

If Congress had adopted some of the measures urged upon it at the last session, this revival of agricultural prosperity might now be endangered by uneconomic adventures which could not easily be abandoned.

The rising of prices, for most products, concurrently with the harvesting season also should lead farmers to question the claim, put forth frequently by leaders of the agitator sort, that prices usually jump upward when planting time is at hand and then fall off radically when gathering time arrives. In a measure, this does happen; for crops gathered in a few months have to be carried more or less through the year, and this costs money. If "manipulators" generally boosted prices at the planting time and then lowered them inordinately when the harvesting season came around, anyone easily could get rich by speculating on this fact.

The Schools and Illiteracy.

A report recently made the illiteracy commission of the National Education Association stated that 4,300,000 persons who can not read and write will be "entitled to vote" in the November election.

This fact, off hand, seems to be startling. From the newspaper accounts, it appears to have been put forth with the inference that it reflects educational conditions at the present time.

It is upon such technically correct but inferentially false statements of fact that propaganda, leading to much confused thinking and often to pernicious legislation, is based.

The statement, however, isn't fully correct even technically. Had it gone only so far as asserting that there are 4,300,000 adult illiterates in the country it would have been technically correct, that is on the basis of the last census findings. But put that way it could be made a flattering instead of a condemnatory reflection of educational conditions. For the figures show that nearly all of our illiterates are adults; that is, in so far as they reflect domestic educational conditions at all they reflect those of former times, even as long ago as seventy years back. Practically a million and a half of them are foreigners whose illiteracy reflects in the main educational conditions that prevail or once prevailed in the countries from which they came. Many thousand of these still are aliens and thus would not be "entitled to vote" even were they literate. Another million and a half are negroes, some of them ex-slaves and most of them living in States where the laws do not permit them to vote. A large number of the native white adult illiterates live in States where one must be able to read and write in order to qualify for the ballot.

For adults more than 21 years old the illiteracy rate in 1920 was slightly more than 7 per cent. For foreign born and negroes it was considerably higher than for native whites.

For all persons ten to fifteen years old the rate of illiteracy was only 2.3 per cent. Of the 12,502,582 persons in that group, the one definitely within reach of the schools, only 292,467 could not read and write. Only a few more

than 100,000 of these were whites—85,485 being of native and 16,632 of foreign or mixed parentage. Of those of native white parentage only 1.1 per cent were illiterate; of the children of foreign born or mixed parentage less than 1 per cent were illiterate.

Thus, barring the negroes, there is almost no removable illiteracy among those of the population within the purview of the ordinary public schools. And if one studies them by age groups, one finds that the negroes—who seventy-five years ago were close to 100 per cent illiterate—are becoming literate with remarkable rapidity even in the South. Of those ten to fifteen years old only 11.4 per cent were unable to read and write four years ago. Of those 65 years old or over 68.3 per cent were so classed.

There is, of course, vast room for continued educational progress, via the common schools and otherwise.

But it may be doubted if such can be promoted along sound and intelligent lines if facts regarding conditions are distorted by those who should speak authoritatively.

Such distortion of facts account for much of the apparent support that is being given proposals like those embodied in the so-called National Education Bill which is being pressed for adoption on Congress. Many persons believe that the adoption of this measure would be a step backward. It could be fully justified only on the ground that the public schools as now administered are not progressing, which assumption is countered by real facts, even those having to do with illiteracy. Virtually in no other field have we made or are we making greater progress, and this is true of every section, every State and almost every community in the country.

Interesting Possibilities.

With two leading candidates largely of the same temperament and type and a third one who hardly can have a chance of election, the national campaign resolves itself largely into an affair of chanceful but highly interesting possibilities.

In fact, discussion of it at this writing appears to be confined largely to speculation as to what may happen in case any one of several results determinable largely by fitful chance comes out of the November election.

One helpful result of it all may be the fastening of attention on our too complicated and perhaps antedated scheme for choosing men for President and Vice President. Changed by practice, the scheme ordinarily works simply and well; but practice ignores all but its frame-work and in case of several events beyond the power of practice to control the scheme would become fully operative—that is, if it can operate fully.

The selection of the next President may depend on how many votes Senator LaFollette, the candidate who probably will run third, receives not in the country as a whole but in those States where his strength is greatest. LaFollette might receive five to ten million votes distributed evenly over the country and yet not secure a single electoral college member. Conversely, he might with only a million or two votes concentrated in a few States get enough electoral college strength to cause the election of President to be thrown into the House of Representatives. He centainly will carry his own State of Wisconsin and perhaps several others. The number of votes he gets throughout the country will throw an interesting incidental sidelight on politics, even though the effect on the election be not radical. For thus will be demonstrated whether third party movements, in the absence of demand amounting to virtual revolution, can make any great headway in the face of laws and customs which have come about in recent years. These now require such a vast amount of preliminary attention to details, such as getting up petitions in many States for putting names on ballots and then for getting out the vote, that it is doubtful if such a movement can get very far in the country as a whole during the first campaign in which it functions. It is interesting to note that these impeding complications, notably those brought about by law, were originated by persons largely of the LaFollette type and for the purpose of facilitating political independency!

What will happen if LaFollette gets enough Electoral College votes to prevent either Coolidge or Davis from commanding a majority of that body?

The Constitution directs that, in such case, the House of Representatives select a President from among three candidates receiving the largest number of electoral college votes.

It would be up to the present House of Representatives and not the one to be elected this Fall to do this. Quite probably it would be unable to act, for the reason that none of the eligible candidates would be able certainly to get a majority even there. The members of the House would vote by States, each State having one vote. The Republicans nominally would have the votes of twenty-three States and the Democrats of twenty. But the vote certainly of one Republican State, Wisconsin, would be controlled by LaFollette. The parties share evenly the Congressional representation of five States, which would be tied and thus probably would be unable to vote at all.

A deadlock, resulting in failure on the part of the House of Representatives to elect anyone, might come about.

Then it would be up to the Vice President to succeed to the office of President. This would be the Vice President chosen by the Senate from among the two candidates receiving the highest number of votes in the Electoral College; that is, in the event of that body failing, as under these conditions it no doubt would do, to elect a Vice President.

There are fifty-one Republicans, forty-eight Democrats and two Farmer-Laborites in the present Senate. The Republican majority of one is quite insubstantial, for it includes Senator LaFollette and several other nominal Republicans who are his followers. In case the choosing of the President were thrown into the Senate the LaFollette Senators could decide as between the Republican and Democratic candidates.

But suppose they refused to decide?

Then the machinery through which Presidents are and may be chosen would be completely stalled.

Some special device, outside of the Constitution, would have to be set up, as was done in 1876 when the Hayes-Tilden affair brought about a situation that neither the Constitution nor the statutes had anticipated.

These possibilities are interesting to speculate about; but, after all they are only possibilities, and quite likely very remote ones, too.

These speculations, however, are apt to attract more serious thought than the dominant issues in the campaign.

In truth, as between the old parties there are no outstanding dominant issues beyond the traditional and always vague differences in their points of view.

The issue of honesty in government is allayed very largely by the Coolidge and Davis personalities; the public has full confidence in the personal and political probity of each of them.

The complications which may arise on account of the LaFollette movement bring to the front, though it probably won't be much noticed, a factor second only to honesty in government. This is responsibility. Whatever else is done, full trust for carrying on the Government should be placed somewhere and definitely. No room for alibis, on the ground, for example, that the person elected President was given a Congress which wouldn't play with him, or vice versa, should be allowed.

One of the troubles of the National Government in recent years has been due to the difficulty of fixing, beyond all question, full responsibility, for the manner of its handling. Several Republican members of the present Congress are now seeking re-election by swinging to the coat tails of Coolidge, the leader whom they "threw down" on every important issue between the President and Congress. This shouldn't be possible.

An Air Drying Sizing Machine

BY JOHN W. CARD.

A few months ago a large southern cotton mill purchased and installed two air drying sizing machines to supplement the fleet of cylinder sizing machines operated by that firm. Air drying machines for tape sizing have been in use in one form or another for some sixty-five years, yet the representative of the English firm sent here to install these machines stated that there were no other air drying sizing machines of this type in cotton mills in America. There are two other such machines in America, but not in cotton mills. It is understood that this type of machine has come into general use in the British Isles and on the Continent. Many cylinder slashers have been changed over to air drying slashers by having the cylinders exchanged for the air chamber. The headstock, size box, and creel are of the same type as that in general use with the cylinder slasher.

The makers of the air drying sizing machine claim that by this system of drying an increase of 25 per cent to 30 per cent in production can be obtained, assuming the same counts, conditions of sizing, etc., while the steam consumption compared with that of a cylinder sizing machine, can be computed at about 30 per cent less. Also the fact that the warp threads are not at any time subjected to any flattening contact is claimed to constitute a decided improvement on cylinder contact drying by preserving the roundness of the warp yarn and giving the much desired "cover" in the cloth.

Experience with these machines bears out the maker's claim as to increase in production and preserving the roundness of the yarn. There is no reason to believe that the claim as to steam consumption is not correct, though to date, there has been no opportunity to measure and compare steam consumption with that of the cylinder slashers.

As stated, the air drying machine differs from the cylinder machine in its drying arrangement. The drying chamber of the air drying machine is made up of the following parts:

Framework.
Gilled heating pipes, or radiators.
Guide rollers.
Revolving swifts, or skeleton cylinders.
Drying fans.
Exhaust fan.

The framework for the lower portion of the drying chamber, which portion encloses the gilled heating pipes, or radiators, is made up of a cast iron frame work, filled in with wooden sections. These wooden sections are buttoned to the frame work along the sides of the drying chamber and may be unbuttoned and removed from around the radiators at will. One or more sections of these wooden sides must be removed on numerous occasions each day, while operating, to prevent scorching. Both end sections on the right hand side of the drying chamber have small doors at the place where the steam control valves are located, this to facilitate the opening and closing of the valves that control the flow of steam to the four rows of radiators.

Along each side of the machine the top of the wood frame is formed into a shelf about eighteen inches wide. By standing on this shelf the slasher tender is enabled to get at the windows in the upper portion of the frame to cut laps, oil the fans, etc.

The upper portion of the frame work is made up of two rows of hinged windows each containing small panes of glass. The slasher tender is thus enabled to watch the progress of the yarn through the upper portion of the drying chamber and also to control the amount of heat in the air chamber by opening and closing the windows as needed. The intense heat in the drying chamber does not allow the glass to be put in with ordinary putty—a special variety is used for the purpose. Front and rear portions of the upper frame are also made up of windows.

The drying chamber is heated by means of gilled heating pipes, or radiators. These radiators practically fill the lower section of the drying chamber, there being only about four inches clearance between rows for the passage of the yarn. There are four rows of 24 radiators each. Each radiator is designed to give maximum radiation of heat for a minimum steam containing area. They are tested to 500 pounds per square inch and are used with steam at boiler pressure.

Each radiator is connected to its neighbors by a U-shaped connecting pipe. Each row of radiators has an inlet valve at the size box end of the slasher and an outlet valve at the headstock end. By opening and closing these valves 1, 2, 3 or 4 rows of radiators may be used. There is no means cutting in less than a row of 24 radiators but there is no need for such. After passage through the radiators the steam is trapped in the usual way.

The yarn is run back and forth between rows of radiators in the air chamber by being bent around guide rollers. These guide rollers run on ball bearings and offer the least resistance to the passage of the yarn from size box to headstock. The wet yarn is prevented from sticking to

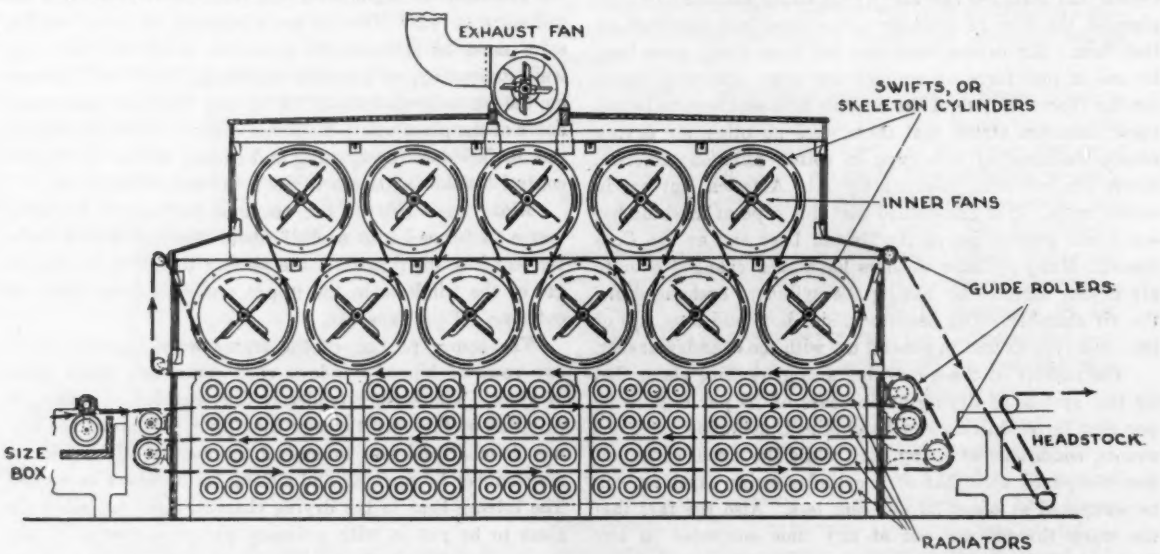
these rollers by brass ribs around their periphery. There are approximately 58 yards of the yarn in the drying chamber at all times. That the elasticity is not taken out of the yarn in winding around these rollers through the drying chamber can be proven to the satisfaction of the most skeptical, for any man can pull the yarn through the drying chamber with one hand and it is not a hard pull at that.

After the yarn leaves the size box it passes around the guide rollers back and forth between the rows of radiators. As stated there are only four inches of space between rows of radiators and to the uninitiated it looks impossible to have the sheet of yarn pass from a back guide roller some 20 feet to a front guide roller and not sag enough to catch on the rough, cast, radiators. However, with months of use there has never been an end to catch and break out because of this fact. The fact that it passes so close to these radiators makes the wet yarn easy to scorch and it has been found necessary to keep the yarn moving and not allow any appreciable stops if scorching is to be prevented. For slashing 13's yarn, 3,000 ends at 40 yards a minute, it is necessary to keep about 160 degrees F. in the drying chamber. At 160 degrees the yarn dries satisfactorily in its passage but a short run on slow motion here will allow the heat to run up to 185 degrees F. where it is found that this body of yarn will scorch. Sheets of fine yarn will not scorch even at the extreme heat of 220 degrees F. unless run on slow motion for an unnecessarily long time. In order to prevent this scorching it has been found that one or more wooden sections must be removed from around the radiators so that the heat can escape—this will enable the machine to be run on slow motion without scorching the yarn.

After passing between the rows of radiators the yarn passes to the upper portion of the air chamber and onto the revolving swifts, or cylinders. These swifts consist of armed rings connected by 12 cross rods. They are about three feet in diameter and five feet long. The 12 cross rods are made of rust-proof metal. Inside of each of these swifts is a fan which revolves at 400 r.p.m. and thus throws the air against the sheet of yarn being drawn slowly around the fan. Each fan has four wooden blades and is carefully balanced for smooth running. Each swift runs on ball bearings using the fan shaft for its shaft. The fan shafts fit into fixed bearings on the frame.

There are two tiers of swifts, six on the bottom and five on the top. Each swift has its fan and all are alike. The yarn passes around a bottom swift, up over a top one, and down again around a bottom one and so on around the eleven. The yarn is thus alternately exposed on one side then the other, allowing the hot air to be fanned against both sides in turn. Occasionally an end breaks and laps around one of these swifts. The slasher tender is accustomed to looking through the windows and soon sees the lap. The fans may be stopped independently of the moving yarn by pulling the fan belt onto a loose pulley and this is done when it is necessary to cut a lap back near the center of a swift. If the lap happens to be on a top swift the attendant has a hot time getting it for the heat escaping from the window, opened to cut the lap, is terrific. Fortunately these laps have a habit of appearing at the rate of only about one a week.

After passing around the last fan the yarn goes around a guide roller and comes out near the top of the drying chamber and down to the headstock. Nowhere is the yarn exposed to a flattening pressure, such as that of being drawn around a cylinder, and on emerging from the drying chamber it has a good, full, mellow, feel. The yarn feels numbers heavier than that dried on a cylinder slasher.



Sectional view of drying chamber, with 11 revolving swifts or skeleton cylinders, and 96 radiators.

An exhaust fan is placed on the top center of the drying chamber and serves to keep the steam and saturated air pulled out of the chamber and so to prevent the windows becoming steamed. The oil escaping from the bearings of this fan caused considerable trouble and waste until pans were put under the bearings, and also under the body of the fan, to catch the drops of oil that had been traveling along the fan shaft from the bearings and finally falling on the yarn. To anyone installing such a slasher it is advised that these pans be placed at once for they are certain to be needed.

Normal production for this machine with 3,000 ends of 13's yarn, 7½ per cent size, and a steam pressure of 130 pounds per square inch, at the slasher, is 40 yards per minute. Under these conditions the thermometer will be registering 155 degrees to 165 degrees F. A steam gage is

mounted on the front end of the air chamber and the slasher tender by glancing at this can tell whether or not the yarn is drying properly. A thermometer is mounted at the size box end of the air chamber and the slasher tender also has this to aid in controlling the slashing speed. With both a steam gage and a thermometer there is no difficulty in knowing when to speed the yarn up or down to keep it drying properly. Finer yarn can, of course, be run faster without fear of under drying. The speed range with the driving pulley now used is 20 yards minimum to 60 yards maximum per minute. 2,400 ends of 23's yarn and light sheets of 8's and 13's yarn have been run at the maximum speed of 60 yards a minute and no difficulty experienced in getting the yarn dried properly. In fact, on such occasions it is necessary to cut the steam out of a portion of the radiators to prevent the heat from running too high.

The course of the yarn through the air chamber can be altered to suit the body and counts of yarn being run. It is not necessary to have 58 yards of yarn under the influence of the drying chamber heat at once. If desirable, the course through the drying chamber can be materially shortened by not bending the yarn around all of the swifts or not sending it between all the rows of radiators.

Very little breakage takes place in the drying chamber and very few ends break at the split rods or comb. This is largely due to the fact that the yarn is not at any time subjected to undue strain. It might seem that a number of laps would show up on the eleven swifts but this is not the case. Very often the slashers are run for a week without having a single lap on these swifts.

With the air chamber working properly, with an efficient sizing system, designed by the mill superintendent, automatically delivering size as required, and with a very small number of broken ends to deal with, the air drying sizing machine is being operated daily, and is giving as much service and satisfaction as could be expected of a good machine.

The Five Factors of Success

BY RUSSELL BYRON WILLIAMS.

First of all, folks, I want to introduce a friend of mine, Patrick by name. Patrick was one of those chaps who was either a sergeant or a buck private, according to his behavior. He made an excellent sergeant, being possessed of the gift for handling men, but every once in a while he would go off on a big toot, during which he would try to tell the captain how to run the company. It was on such occasions that he was usually reduced to the rank of private until such time as his drunk had tooted itself out.

The last time I saw Patrick he was neck deep in a dirty, muddy, bone-chilling river just north of Verdun, one cold, drizzly, September morning. He was down there in the mud and muck assisting in the construction of a temporary bridge. And only two days before he had been in charge of a platoon! But the "vin blanc" had mastered him and for the umpty-steenth time he had been divested of his stripes and was again a lowly private, suffering the consequences of his poorly controlled appetite.

Finding Patrick in this condition, shivering and blue with the cold, I called: "Ho—Pat! How's tricks?" Patrick looked up, recognized me, and yelled back: "Suoire—O'im cold and O'im wet to the skin—O'im dirty and O'im lousy—O'im ten towsend miles away from home and lonely—O'im near froze to death and O'im a buck private. Now what'n'll more could a man ask?"

Now I haven't introduced Pat for amusement only. I want to point out that valuable asset, the ability of making the best of every situation. Pat was a chap who could turn his Irish wit and grin on any circumstance and give the impression he was glad things were no worse. And you'll agree, probably, that this spirit is needed in commercial circles today. We shall always have periods of over-production of goods due to industrial miscalculations. These will always be followed by periods of digestion. It is now recognized that 1923 was a year of over-production and that 1924 is a period of digestion.

So—with your businesses up to their necks in taxes, cold with the prospect of the payment of a soldier's bonus and with the almost definite assurance that there will be a big fight in the coming Congress for a second bonus made on the cash payment plan, lousy with business barnacles and political misinformation, and overshadowed with the mythical fallacy that a Presidential year means poor business, we can certainly harm nothing by emulating our friend Patrick and say, optimistically: "What'n'll more could a man ask?"

First Factor—Will Power.

Look at your hand. You will find there one thumb and four fingers. Can you pick an article, such as a pin, from the floor without using your thumb? Not without difficulty. The thumb was put on your hand to enable you to complete a desired action—to grasp things. The thumb represents the will of the hand. Without it your hand would be rendered useless, and without will, you would be equally useless. With will, you can say, do or be the opposite of nothing.

Will, to put it briefly, is stubbornness. And you know better than anyone else that at times you are stubborn. Go to the woman who knows you best, be she your wife, mother or sweetheart, and she will tell you of incidents when you set your front feet before, your hind feet behind, and your hat fell to the ground because of the length of your ears. Every man has a streak of the mule in him. Some allow this streak to go beyond the mule stage and make an ass of them.

So—instead of exercising your stubbornness on your unoffending wife or adoring mother, practice it on yourself. Sic it on your desk and your business, and when a problem presents itself, set your feet, let your ears grow, and say, either: "I will" or "I won't," according to circumstances.

When you hear a lot of loose talk by some of our would-be economic prophets and business cycle advocates about this being a reactionary, slow year, just tell them Napoleon said "Europe will be either Cossack or Republican"—that the astute Pitt predicted that the end of papacy was "in sight"—that Disraeli uttered the statement in '64 that Prussia "is a country without any bottom and could not maintain a war for six weeks." Loose talk does a great

deal of damage year in and year out, and it is only because your will-power is lazy that you permit your friends to voice such utterances without sensible contradiction. When, in 1760, Rosseau said: "Twenty years hence England will be ruined and furthermore will have lost her liberty," what chance for accuracy has your near-executive friend when he says people are losing confidence in our government,—that the voters won't stick to the established parties this fall,—that our coming administration will be radical, the consequences of which would throw this country into chaos?

Exercise a little stubbornness, a little will-power, on the obviously inaccurate statements made by politicians and newspapers and on the misinformation furthered by otherwise sensible citizens, and both your business and yourself will benefit.

Second Factor—Police Your Mind.

If your bookkeeper or janitor should leave as much dirt on your desk as you carry around with you every day in your mind, you would fire him on the spot. Not long ago I attended a convention of manufacturers. While there I talked with an influential, well-respected manufacturer; one who enjoyed considerable prestige in his community and industry. During this conversation he laid his hand on my shoulder, by way of emphasis, and gave utterance to four or five burning, stinging, red-hot words of profanity—simultaneously with which his wife put her hand on his arm that she might attract his attention to her needs. You should have seen his face when he realized his wife had heard him curse! It would have made a good death mask for Dante! When she had disappeared, he turned to me and said: "Williams, don't it beat hell how this damned profanity misrepresents one."

Now I am not going to discourse on the detrimental effects of profanity or vulgarity. You have more intelligence than I and even I know if you keep that sort of mental filth about you it will surely misrepresent you at just the time you least desire misrepresentation.

Lies are another form of mental dirt. Lies, worry, fear, doubt, distress. Of course *you* don't lie—unless you are married. But why allow others to lie to you? You might as well lie yourself as admit a lie from others.

One of the gratifying developments of the past few weeks has been the order given to Washington newspaper correspondents to "play down the investigations." That order should have been given long ago. We should never have heard much of the piffle and bunk that has filled the newspapers during the past several months, for a great deal of it was just unclothed, nude, naked lies. And the real danger in lies is that you, otherwise sane, are liable to repeat them, thus sending them on their destructive way.

Lies are terrible things. They are mosquitos equipped with buzzard wings and the voice of a Big Bertha. They can be heard from Kamchatka to Edmonton and they have caused more trouble in these almost United States than all the Kansas cyclones, Ohio tornadoes, yellow fever, gout, boll weevils, rust, smut, ticks, fleas, rattle snakes, scorpions, boa constrictors, snapping turtles, mad dogs, indigestion, blizzards and floods that we have ever known—or ever will know. Lies generate wars and can make the Devil go skiing, take refuge in a church and yell for ice cream cones.

Back in the early days one said George Washington was a woman-chaser. Another liar said he was a thief. This second liar started an investigation and proved, at least to his own satisfaction, that George had stolen $2,000,000 from the United States Treasury. One newspaper in New York City, sixty days before the termination of the Washington administration said, editorially: "If this government can stand two more months of Washington, it will be well nigh indestructible."

Funny—? No more so than the political lies broadcasted today. Why do you let 'em get away with it? Sweep away the mental dirt,—the lies, profanity, doubt and fear. Do it with the same aggressiveness you display in attacking the morning newspaper and the fervor with which you breath your daily prayer: "Give us this day our daily mail."

Third Factor—Physical Fitness.

Chicago lost a man, some years ago, who was and is mourned by thousands, the world over. A man of keen wit and preception—Bert Leston Taylor, more widely known as "B. L. T." It was he who said that of all human habits the most dangerous was the "deadly sitting habit." Hooch, tobacco, opium or profanity do not compare with the "deadly sitting habit" in calculating the effects on the business men, their businesses and their minds.

Go to any club, hotel lobby, or other place where men congregate and you will find there a number of men ensconced in great overstuffed chairs, their feet against a wall or a-top a radiator, about 36 inches higher than their heads—that their ideas might run down. Laziness does not breed ambition or efficiency, and "the deadly sitting habit" is nothing more nor less than simon-pure laziness.

Never was there a time, at least since the War, when the general, long-distance business outlook was more promising than it is today. It is a fact that business is only fair right now, that there has been a reduction in unfilled steel orders, that the wages in some industries remain at 1919 levels, that over-development of productive capacity is having its telling effect, that unemployment is on the increase and that our recent Congress persistently refused to exercise economy with public moneys.

But—

Look at the condition of Europe today. Far brighter than it has been since 1914. There never was a day when the United States was so much the leader among nations, politically, economically, industrially. Industrial activity has moved westward and will continue in that movement. This stimulates the growth of cities and brings the farmer nearer his market. Since 1880 the wages of workingmen have increased over 400 per cent. Since 1900 the personnel of manufacturing industries has doubled while the total value of fabricated products is now six times the total as of twenty years ago. Since 1905 the proportion of workers under the age of 16 years has decreased 60 per cent.

According to one statistician, the American people spend, every day in the year, over $1,000,000 for coffee, $8,000,000 for milk, $5,000,000 for eggs, $3,000,000 for gasoline with which to run the 11,000 automobiles that are purchased every day. The daily sale of insurance policies exceeds $16,000,000 and one chain of five-and-ten-cent stores sells over $500,000 worth of merchandise every working day. The people in this country go on vacation trips to the tune of a round $3,000,000 a day—and they have spent these sums, and will continue to do so, regardless of temporary business fluctuations.

Now—are you going to lend ear to the rumor-mongers and hibernate in an overstuffed chair and mope, or are

you going to get out with the kiddies, play ball, go swimming, or punish a golf ball, thus keeping yourself physically fit that you may cash in on our wonderful future. The mind of man cannot conceive the prosperity held in store for this country by the all-powerful, Supreme Architect.

Fourth Factor—Self-Abandonment.

Your life is the most important life ever lived—so far as you are concerned. But it is well to keep in mind there are others on this planet and that they have equal rights to all its pleasures. The chap with the self-satisfied sense of being the only man on earth usually has a lot of trouble. He continually runs amuck with men who do not think as he does and who are not slow in saying so.

In one of the remote crevices of the Green Mountains of New England you'll find a little cottage, half hidden by great, overhanging trees; the way marked only by a narrow, winding path. At the entrance of this path there is a sign, lettered in a style that bespeaks 1844. This sign bears the legend, in plain sight of every passerby: "There's a cool drink up here. Stop in and refresh yourself." Following the crude finger of the sign you find yourself ushered into a little clearing beside a tumble down cottage. In the center of this clearing, and in the shade of a spreading Jonathan tree, is a deep well of clear, cold water. At the side hangs a dipper, of ample capacity, so that no one need stint themselves of God's greatest bestowal. Just a bit to the left is a bench on which is seated a basket heapingly filled with ripe, red apples. This basket also bears a sign: "Help yourself." The two old people who occupy this cottage are too poor to give to organized charity and they take this means of "living by the side of the road and being a friend to man." Indeed, this is a true story and the gentle old folks living there inspired Samuel W. Foss to pen his immortal lines "The House by the Side of the Road."

How long did you say it had been since you sent a word of encouragement to that workman of yours who is not in the hospital? Did you ever write Tom, or Dick, a letter of sincere congratulation upon his completion of his twentieth year of faithful service with you? (If he stayed with you 20 years he probably merits congratulations.) Have you sent a check to an organized charity since last Christmas—or are you waiting until next Christmas?

Fifth Factor—Admitting the Glad Things.

Just one more little point and I am through. And in bringing out this little but mighty idea I will have to take you back to that thing most of us would like to forget (and some features of which we all too soon do forget)—The War.

During the training days at Camp Custer I once met a chap who was filled with doubt and fear. His face was as long as his rifle and he was the worst grouch in the whole American Army, I do believe. Just before embarking for parts unknown, he fell in with a gang of rough-necks, and the next thing he knew he was under heavy sentence from the provost marshall. He was released, however, under penalty of joining another outfit. This prevented me from seeing him until after the Armistice, somewhere near Souilly. (The natives called it "Sou-ee" and we called it "swilly.") I happened to be bumping along in a side car when I heard a "Yip" to one side, and looking about I saw this ex-grouch among a gang of soldiers repairing a road-bed. I stopped and shook hands with him. He was round and rosy and solid, and his face was wreathed in a thousand smiles. His appearance was so foreign to that which I remembered him as having back in the States that I questioned him regarding the transformation. He told me, in his soldier parlance, that he had "canned the frown and convoyed a smile—and found it a hell of a lot better."

You will find the same. There is a vast difference between a smile and a frown. No one responds to a frown, everyone to a smile. "Loose now and then a scattered smile, and that I will live upon" is Shakespeare's words. You know—it requires the activity of 64 muscles to frown, while it takes but 13 muscles to smile. Why work so hard—?

The Boyce Hand Weaver's Knotter.

A. B. Carter, manufacturers' agent, Third National Bank Building, Gastonia, N. C., has placed on the market the Boyce hand knotter, for tying a weaver's knot, which has been received with considerable interest. There has long been a demand for such a device, as the advantages of the weaver's knot for yarns is well known.

The Boyce knotter is the result of the work of several years by E. E. Boyce, of Charlotte, N. C., and associates, and during the experiments, the device has been put to tests in a number of different mills. The knotter weighs only five ounces, it is stated, but is sturdily constructed; high grade steel being used in its ten moving parts. All direct motions are actuated by a thumb trigger and a cam, while a coil spring brings the parts back into place after the knot is tied. To prevent kinking the machine does not release the yarn after tying the knot until the thumb trigger is released. The operator lays the ends of the guides on the device which ties the weaver's knot and cuts the ends evenly when the trigger is pulled. The knotted yarn is freed when the trigger is released, and the coil spring brings the parts of the device immediately back into place.

Mr. Carter states that over fifty mills are using the knotter under actual working conditions and that there are now over 1,000 knotters in use as regular equipment in cotton mills and yarn processing plants. The device is used to tie single and ply yarns from 8s to 150s, being made in two sizes, one for coarse and the other for fine yarns. Type A handles yarns from 40s to 150s, and Type B handles yarns from 8s to 40s. It is being used in the operations of spooling, winding, doubling, reeling, twisting, etc.

The southern office of H. W. Butterworth & Sons Company at Greenville, S. C., has been removed from the Woodside Building to their own plant on Markley Street, where they are now equipped to do repair and service work on their equipment for southern mills. J. Ebert Butterworth, treasurer, is in charge.

The 1924 edition of the Year Book and Cotton Manufacturers Manual of the National Association of Cotton Manufacturers has just been published. This is the seventh volume in the series, and is larger and contains much material not found in the other books of the series, and in addition contains a compilation of fundamental statistics relating to cotton and cotton manufacturing, not found in other sources. The offices of the association are at 80 Federal Street, Boston, Mass.

Scientific Trends with a Textile Slant

Organization and Genius.

The hardest lesson an ambitious person "having the goods" has to learn is the necessity of a certain degree of conformity of his plans with the rate of progress of an institutional program or that of a section of industry before his own progress can be dovetailed into it. And yet that condition is not only obedient to a natural law but is economically of greater profit than expenditure of effort in ways not aligned with the normal course of events. Even admirable effort is largely fruitless unless so conformed, as witnessed in the powerlessness to assist the state of their own fortune of most of even the great inventors of history.

The finest type and strain of tree thrives best in a well-cared-for orchard of its fellows, deriving its prosperity from the general condition of the group and receiving benefits that it would be unable to make for itself in an isolated or unadapted position.

Organization like education has failed in one respect, however, in that demanding, rightly, uniformity of adherence and output from the majority, it yet fails, frequently, to draw to itself the advantages which accrue from the development within it of the exceptional figure—the genius—the one man in a generation.

Comparatively few people know that Luther Burbank improved fruit flavors and sizes in hundreds of instances and even spent a great deal of effort upon improving sweet peas, yet most people of wide general knowledge know of him for his development of the spineless cactus.

The one outstanding achievement sells the fame of the aggregate performance; it is strange that mass principles in organization and education have failed to pay attention to this converse of their major principle. The outstanding performance stands for even more—it is the nucleus of principle upon which all creative advancement depends—is the only ray to which hope may turn for those epochal advancements *above the average performance* which have revolutionized art and industry.

Misdirected individualism is largely wasted effort—heavily-endowed research without provision for the fostering and the development of individual genius is closely akin to economic suicide.

Economic Participation.

Skillful publicity has done so much to make the public pay overmuch for many things that it is not to be wondered at when some production genius comes along and makes uncounted millions selling value and service for small price in a field from which, hitherto, the great bulk of the market had been excluded by excessive charges.

Yet the "laesus majestas" invoked upon any critic of even an economically unsound advertising policy is terrible in its righteous indignation. Yet, in this day when every man counts the cost of his various expenditures, to assume that selling price is a measure of utility, of relative importance, or of equitable representation and participation in a joint project for the advancement of an entire industry is as reasonable as to invite Morgan and Company to convert their bullion into cut diamonds (at present market price) just because these will exchange for more *per ounce* than will gold.

Nor is this a veiled criticism attempting to nullify the efforts made, in certain lines of textile manufacturing, to get a higher sale price per unit of production through enhancement of quality, for that is a most praiseworthy effort. Rather is it to call attention to how often materials, in all fields, ride to unreasonable peaks of cost through falsely-inflated demand, assisted by press agency, which bears no analogy to the permanent commodity value of such articles.

Recent movements in the laundry industry and in the field of coarser textiles demonstrate the urgent necessity and undoubted benefits to be obtained from careful investigation and improvement of the most ordinary fabrics and fibers—researches which will benefit both producer and consumer.

The only fair estimate possible upon which to assess participation in improvement of an entire industry, in all its branches, is a composite one which should incorporate consideration of the proper ratios of the following factors:

Universality and volume of total application.

Exclusive usefulness, not warranting substitution.

Permanency of each branch of the industry as an institution and social force.

Investment in productive machinery compared to *percentage* of profit per volume of output and investment.

Any other basis would place false emphasis upon flashy elements and leave out of the reckoning the more stabilized and vital considerations upon which depend stabilized living and permanent prosperity. A permanent program for the improvement of a national asset *must be* economically sound.

Comprehensive Planning.

A keen observer of human affairs once remarked that

The bitter controversy and the various motives disclosed by the discussion of our first Defense Day illustrate strikingly how the real beliefs and essential facts on any important issue are beclouded with mistaken and ill-grounded points of view, by prejudice and by expediency. Since every important issue brings these elements to the fore it is necessary to adhere closely to sound and tried principles in laying down the specification for any new project, in order that it may be founded upon a basis of permanency of progress and without regrets.

National Preparedness is a fundamental matter, regardless of such side issues as offense to a hyphen population, a radical labor group's opposition, or a hesitancy to be credited with the wrong political attitude before the world. The fundamental part of it should be put across with such skill as to obviate the objectionable features and eliminate them.

Similarly, the most important issue facing every unit of the textile industry and its dependencies, from today on through at least the next two generations, is the manner of its meeting and disposing of the evils, technical, merchandising, and economic, which result in such untimely slumps in prosperity as threaten the progress, if not, indeed, the very existence, of many elements of the industry.

For this reason it is thought of utmost importance to present the most vital points to be considered in organizing an American Institute for Textile Research. Some of these will seem to bear but remotely upon a research project, yet ignoring them has negatived or stultified former greatly-conceived projects; conversely, it may be brought out herein that certain difficulties of the industry are possible of solution only through such conception, in order that it shall be one having sufficient amplitude as to be, in full measure, physician to the industry's basic ailments.

with all the money that is spent on education in this country our children ought to have the advantages of training in even the special cultures, from The Three Musketeers, at fifty cents a seat, to Anna Pavlowa's troupe, at eight dollars.

The effective disbursement of research budgets is somewhat analogous to this. Systems of assessment are proposed and carried out all over the United States for this and that project and there never seems to be the least trouble in reaching the quota of money that is asked. The important thing to the consumer, however (and we are all consumers) is to see that highest intrinsic value is present per dollar expended lest "expenditures for research" lay undue cost upon selling price, in proportion to benefits achieved.

The cure for this lies in completely-planned projects —planned to the last item of "whereases" and "in cases," so that, regardless of the degree to which experiment into the unknown encounters snags and the necessity for alternatives, little differential from the estimate for each item or project will result.

A competent group of technicians having a sufficiently broad background of experience can lay out such a project in any field of activity if they will get together prior to the initiation of actual work and coordinate every detail of procedure which they will carry out, with expenditure therefor. *But they must take into consideration the necessary factors upon which the successful outcome of the research depends.*

The time has arrived, in scientific research, when it is no longer tenable nor necessary to appropriate budgets to penetrate the realm of the unknown altogether without sense of definite outcome. Properly-planned projects can penetrate to finite results or else completely exhaust the possibilities of development up to the existing state of invention and progress of a science—carrying the project definitely to the borderland which says: "Invent now (along such and such lines), because the limit in known realms is so and so, and we need this type of result (from such and such contributing assets)."

This very thing has been done in numberless instances, where the group engaged in the project possessed an amplitude of information and ability broadly inclusive of the various fields which had to be comprehended for a successful *notable* outcome of the needs of the work.

Scientific research and the work of every skilled technician has sold with undue slowness and at a low order of price chiefly because technical workers have been short on planning, financial and sales ability. They can immeasurably contribute to progress and benefit their own status by proceeding as is outlined for this project.

Tools.

"The best is the cheapest, don't be misled." This idea and the economic factors which prove it should be emblazoned within the early plans of instruction in our schools. It is fundamental to success in great research projects and sound economically, considering distribution of expense among a large number of productive factors.

Recently the technical representative of a large production interest spent a day and a half outlining to the writer certain benefits and improvements in his product which he desired, and had observed from applications of certain specialized work in other fields as likely to result from certain installations under plan of incorporation in his plants. The sales value of the products of this company ran into millions per year and produced what appeared to be an unusually satisfactory percentage of profit on the investment and the competitive status of the business among its fellows. At the conclusion of our talk he said: "But the trouble is this equipment will cost, all told, from twelve hundred to twenty-five hundred dollars." (No questioning the certainty of its utility.) When we countered that it would last a lifetime and would be ample to take care of a constantly-increasing demand upon it as the needs of the business developed he came back once more: "It's a lot of money to spend at one time."

This is characteristic of a point of view which, if allowed to prevail, is bound to retard the development which is demanded from this general textile research project. Such an attitude must not be tolerated here. Once the requirements in development in this project are fixed upon, the equipment must be ample *at its initiation* to provide for all possible demands—upon a large-scale-volume basis to producing results in the very shortest possible time.

Recently, a great deal of study has been given to the problem of turning out that very vital element of research laboratory investigation, the evaluation and measurement of thousands of samples, upon a large-scale-of-production basis. Some of these methods are now in process of publication. Along such lines must come much of the progress necessary to the industrial-scale demand of a general industry research project.

Building the Foundation.

What are the necessary factors upon which depend the successful outcome of broad scale organization of research?

It will be impossible, here, to more than touch upon the outstanding factors.

Machinery: The static position of development in cotton machinery emphasizes only too strongly the vital necessity of aligning two closely-related factors, as the British Cotton Research Association has it: development of machinery along lines of adaptability to the properties of the materials it handles and the nice problem of producing small-scale process machinery (for testing out research results) such that it shall duplicate the *effects* of full-size process machinery. This is a special genius that is, obviously, not possessed, to any great degree outside of a very small group of designers. It is a laboratory rather than a mill-machinery design problem, but it entails considerable knowledge of works production, as well.

Finishing Processes and Materials: An observant printer once remarked that most of his problems could have been eliminated in the cloth-making and wet-preparation departments. Upon a detailed knowledge of the properties and idiosyncrasies of fibers and the evils to which they and the process materials applicable to them are subject, depends any improvement in stabilization of manufacturing and development of marked superiority in quality of high price getting finishes.

Market: "The package sells the goods" in more cases than realized. Package design entails, frequently, modification of the size of the article packed and this may greatly affect width of a cloth, weight, selvage, etc. Relation of color of cloth and package color are almost too obvious to mention. Packaging involves all the elements of advertising and display knowledge, plus adaption of

pattern, material, and container. There are many advertising men but few good packagers; and packaging elements may enter very much more largely than at present into the merchandising of textiles in the future.

Chemistry: It is a very hopeful sign of progress that general realization of the inadequacy of many standard chemical tests (for the solution of intricate industrial determination) is being faced and studied, with a view to alteration and improvement. The new science of physical chemistry is far more comprehensive in its picturization of much-wanted facts about any condition in textiles than is purely analytical chemistry. Certainly recent developments in textile research demonstrate the dividend-paying character of this science.

Information: Government technical bureaus act wisely in maintaining an editorial office for the correlation and final preparation of all technical papers issued therefrom. The secret of building up, economically, a logical procedure of attack of a current or even an abstruse problem affecting the growing of raw materials or the manufacture of a product from them is to have in the minds of the framers of this project the "state of the art" up to the present.

One of the greatest functions of the record section (which should be incorporated closely with this editorial function) should be the preparation of two kinds of outlines:

1. A critical reference-outline of all that has been done, previously, that even remotely bears upon the project, and

2. A brief, comprehensive outline of this for distribution broadcast to the interested membership, with the object of soliciting therefrom all the *possible*, vital, feasible suggestions for procedure thereto. It is a case of "bringing all the tithes into the storehouse." No care, search, expense nor scope should be spared to make the bibiotheca thoroughly adequate from which to draw for information and for inspiration.

It is not enough to make a great scientific discovery; it must be tied up to the demand of business conditions and must incorporate, further, the advertising idea of putting before the group it is to serve the exact means of applying the knowledge discovered, as well as emphasizing its importance in the existing situation. Here publicity, statistical, and economic factors should enter and have fullest sway in marketing-distribution of the laboratory product—its findings. Salesology may become the most profitable item of the research project investment—after the project is soundly and firmly established and has something to sell.

Research, testing, invention and development of process-technique are vital *steps* in the ladder of triumphant industrial progress. Soundly based, these are eternal in their weight and scope. It is necessary to have more—they must be broadcasted. As St. Paul put it: "And having done all, to stand."

Towels and Toweling

BY T. WOODHOUSE AND A. BRAND.

The two toweling fabrics exhibited in Fig. 54, and which were woven for demonstration purposes only, are very closely related to each other. They were originally woven to produce contrasting stripes on a 2 up 1 down or prunelle twill ground, but the effect of this arrangement was not very successful. Either of the fabrics, however,

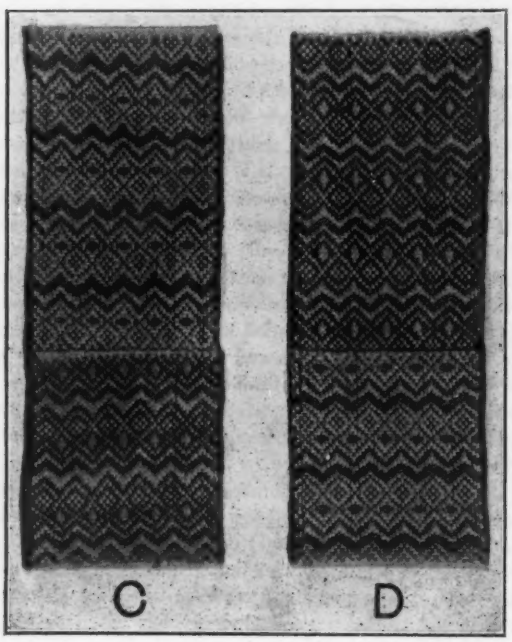


FIG. 54.

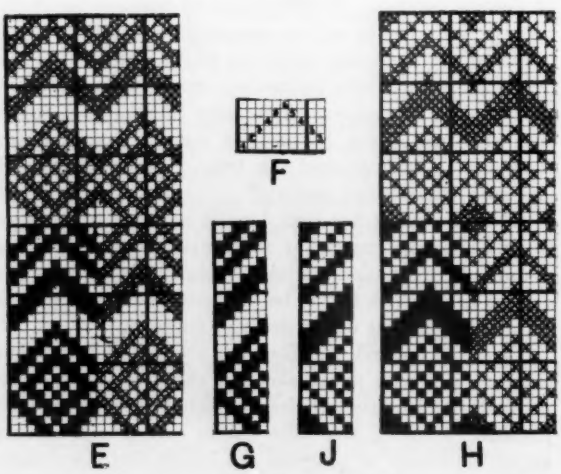


FIG. 55.

would be quite successful if used as an end or cross border for a towel, and also possibly in the production of fine qualities of roller toweling from white warp and filling, in either all cotton, all linen, or unions.

Both samples C and D in Fig. 54 have the bottom part turned over in order to exhibit the backs of the fabrics, and a cursory inspection is sufficient to show a similarity between the turned over portion of either fabric with the upper portion of the other. A closer examination will reveal the fact that the patterns are identical, and that the turned over portion of each one is upside down with respect to the upper portion of the other. Indeed, the two

fabrics are absolutely identical, but the face of one is the back of the other.

The weaves and cloths exhibit horizontal rows of diamonds separated by a waved or arrow-headed band partly developed in warp and partly in filling. The sole difference between the two patterns is that the warp portion of one is the filling portion of the other.

Sample C, Fig. 54, is woven from the point paper design E, Fig. 55, where four repeats are shown, the unit design being in solid black squares. The draft is shown at F, while the weaving plan is given at G. Both F and G show that the cloth is capable of being woven by the aid of six harnesses with 24 picks to the round.

Sample D, Fig. 54, is woven from design H, Fig. 55, using the same draft F, but the weaving plan J. It will be seen that the marks in weave E correspond to the blank squares in weave H, and vice versa. Both samples in Fig. 54 are produced from 2-fold mercerized cotton yarns; there are 52 threads per inch in the warp and 54 picks per inch of filling. The warp is white and the filling green. The comparatively large number of picks to the round, viz., 24, would necessitate the employment of a dobby, or a positive tappet loom. An effective design could probably be made by taking either weave, E or H, Fig. 55, and uniting it with its reverse weave, i.e., reverse both in markings and in direction.

A very successful diamond effect is obtained in the fabric reproduced in Fig. 56, the original of which was woven for pattern purposes, with bleached single flax tow warp, and indigo blue 2-fold cotton filling. A similar fabric made for commercial reasons would contain flax tow warp and filling of the same color, or perhaps, unbleached flax tow warp, and bleached flax tow weft; while a superior cloth of the same design could be made from line yarns.

The fabric in Fig. 56 contains 48 threads per inch of warp and 48 picks per inch of filling. It will be seen that the lower half of each diamond contains a figure which approximates to a crude representation of a pair of wings developed in white on a blue ground, while a close examination reveals the fact that the upper and lower halves of the constituents of each diamond-shaped space are exact opposites both in direction and in marking.

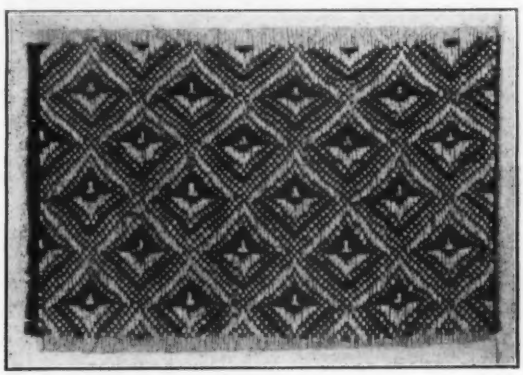


FIG. 56.

The opposite natures of the two halves of each diamond are more readily seen in the point paper design for the fabric as shown in Fig. 57; four repeats of this design appear in Fig. 57; the unit weave is in solid black squares, and the other three units or repeats are in crosses. The weave is complete on 30 threads and 30 picks, and requires 16 harnesses. One weaving plan and its corresponding pointed draft are given respectively at K and L in Fig.

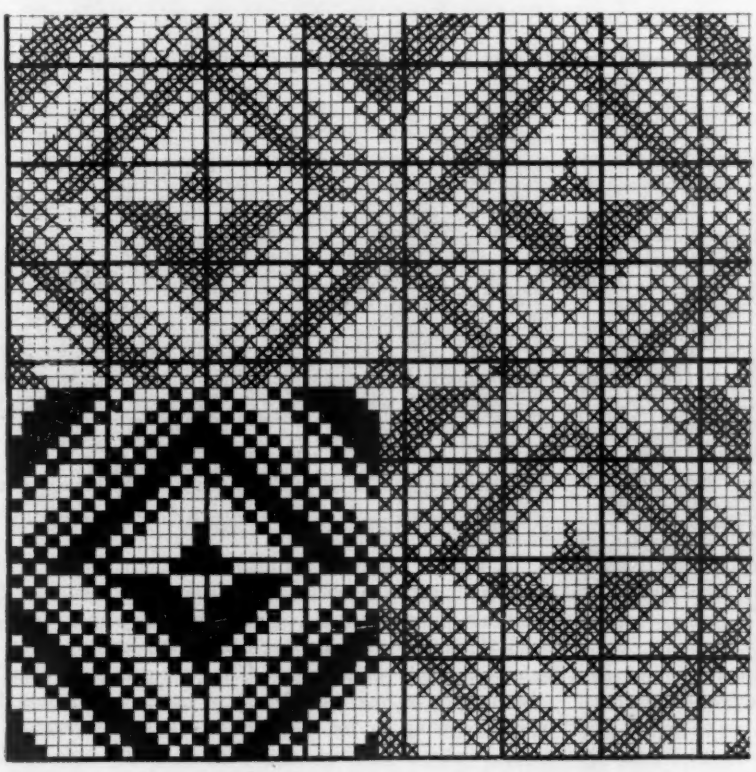


FIG. 57

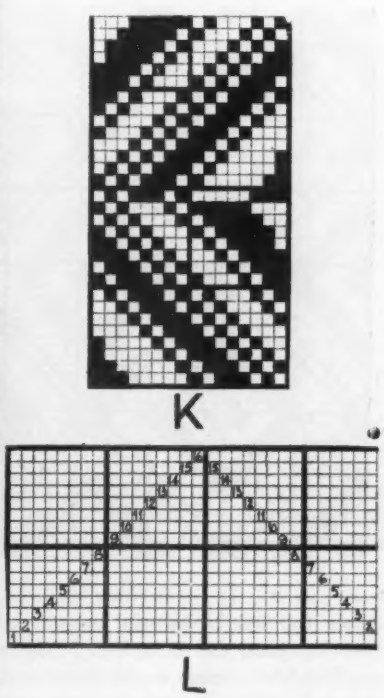


FIG. 58.

58. Long floats are prevented, and, incidentally the winged effect is accentuated, by introducing a mark on the 16th thread and the 19th pick, Figs. 57 and 58, and by omitting a corresponding mark on the same thread on the 12th pick.

This type of diamond weave is characteristic of a class which can be most easily produced by employing pointed drafts such as that illustrated at L, Fig. 58, and

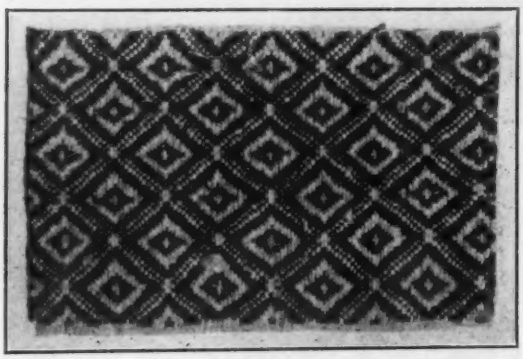


FIG. 59.

in which the total number of threads, n, is always equal to a number that is 2 less than twice the number of harnesses necessary, h, i.e.,

$$n = 2h - 2 = 2(h - 1)$$

A diamond design fabric, of a more orthodox type than that in Fig. 56, is reproduced in Fig. 59. It is developed by the same kind of yarns, and in the same sett, as the fabric illustrated in Fig. 56, and was also woven originally for demonstration purposes. Four repeats of the point paper design are shown in Fig. 60; the unit is in solid black squares, and is complete on 30 threads and 30 picks. It requires 16 harnesses for its reproduction in the loom,

FIG. 60.

using the first 16 threads and 30 picks of Fig. 60 as a weaving plan, and L in Fig. 58 as the harness draft.

The fabric design is effective, but it has one slight fault which is almost inseparable from patterns of this nature. In many of these weaves long floats of warp, of filling, or

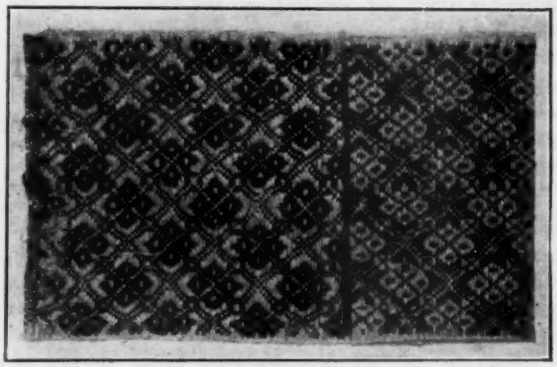


FIG. 61

of both, are found in immediate proximity to very short floats. When this happens, it is almost inevitable that the short floats become more or less completely obscured, and the smartness of the pattern is thereby adversely affected. In the present case, reference to Fig. 60 will show that amongst others, there is a filling float over 7 warp threads in the 6th pick (counting from the bottom upwards) in close proximity, actually next to a warp float over one thread on the 5th pick. In the actual fabric, the short float of one is completely obscured by the long float of seven, but the comparatively fine setts and yarns prevent the fault from being serious. In some cases, when the fault is likely to be easily noticed, the addition or sub-

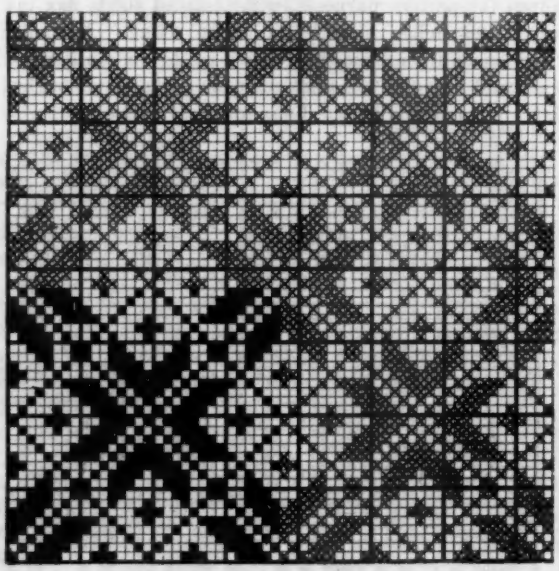


FIG. 62.

traction of marks to or from the design as originally planned will often improve the outline of the diagonal ornament.

A further example of a diamond pattern, woven in the same sett, with the same sizes and types of yarn, and for the same purpose as the two previous examples in Figs. 56 and 59, is illustrated in Fig. 61. Rather a neat effect is obtained, while the warp and filling are practically equally distributed, so that the fabric is eminently suitable for roller toweling, or for the body of a complete towel. The same slight fault which is present in the example in Fig. 59 is perceptible, viz., the obscuring of the short floats

over one thread by contiguous long floats over several threads; nevertheless, the complete effect cannot be said to be very adversely affected by the defect.

In Fig. 61, a selvage is shown at the left-hand side of the sample, and a small portion of cloth at the right-hand side has been turned over to exhibit the design on the back of the fabric. It will be seen that with this particular design, good effects are obtained on both sides of the tex-

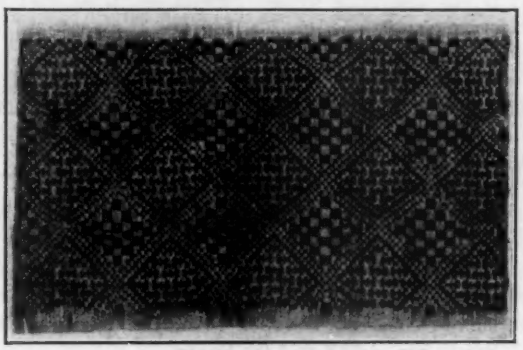


FIG. 63.

ture. Such good effects are not always obtained with somewhat similar weaves; occasionally a particular design falls to be rejected because one side of the resulting fabric develops unexpectedly objectionable features.

The groups of four little diamonds in Fig. 61 form a pleasing and characteristic feature of the back of this fabric. It is hardly necessary to mention that the terms "face" and "back" are used relatively only, with particular

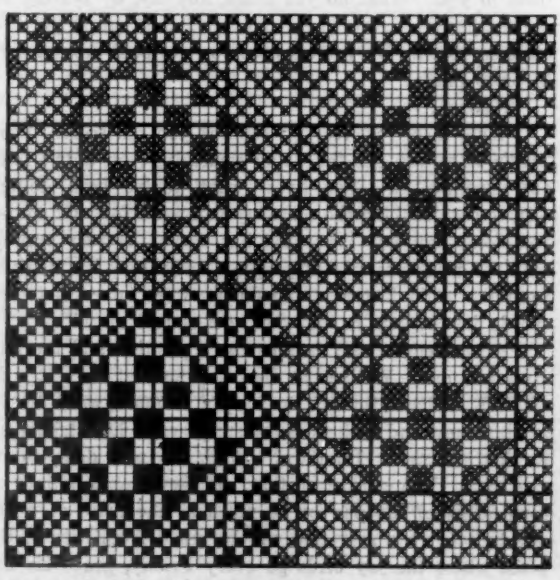


FIG. 64.

reference to the positions occupied by the respective sides of the cloth while being woven in the loom.

The point paper design for the fabric in Fig. 61 appears in Fig. 62, where four repeats are shown, the units, on 30 threads and 30 picks, being in solid black squares. The number of harnesses required is 16, using the first 16 threads and 30 picks as a weaving plan, with a pointed draft identical with that shown at L, Fig. 58.

A distinctive effect is apparent in the towel fabric illustrated in Fig. 63, the original of which, woven for demonstration purposes only, is made from the same kind and counts of yarn, in the same sett, and on the same number of harnesses as the three previous examples in Figs. 56, 59 and 61. The point paper design appears in Fig. 64, where four repeats are shown, the unit in solid black squares.

Sixteen harnesses, as already indicated, are necessary; the weaving plan or pegging plan is formed by the first 16 threads and 30 picks, and is used in conjunction with draft L, Fig. 58. The diamond figures in Fig. 64 are omitted in plain weave, and the alternate diamond-shaped spaces are filled in with distinctive 6-harness weaves. One of these weaves is the 6-thread, 6-pick regular basket or hopsack, while the other weave is the 6-thread, 6-pick imitation gauze, already referred to in connection with Fig. 40. Given a suitable choice of weaves, this method of producing fancy diamonds is often very successful.

These last four examples, illustrated in Figs. 56, 59, 61 and 63 are interesting examples of what can be done in a particular warp by variation of the weaving plan alone. All the above four designs are complete on 30 threads and 30 picks, and capable of being woven on 16 harnesses with a pointed draft. It will also be seen that, if desired, the design at V, Fig. 49, could be woven also by 16 harnesses instead of 8 as shown. The sole differences in the designs are in the actual lay-out of the weaving plans, all of which are necessarily distinct.

(To be continued.)

The textile industry receives consideration in the July issue of the Harvard Business Review, which is published by the graduate school of business administration of Harvard University.

One article deals with "Some Commercial Aspects of Styles and Fashions in the Clothing and Textile Industries," written by Paul T. Cherington, director of research of J. Walter Thompson Company. Mr. Cherington differentiates between creative lines, popular selling lines, and staples. He traces the steps in the life history of any particular vogue and suggests definite steps for eliminating needless waste in the process of developing fashions. Another article is "The Agitation for Control of the Lancashire Cotton Industry," which is an intimate study of the vital factors in the present condition of the cotton industry. It takes up diminution in world consumption of cotton goods since the war. Plans for adjusting production to consumption are discussed. The article also includes illuminating facts and figures on the organization of the British cotton industry. Copies may be secured from A. W. Shaw Co., Cass, Huron & Erie Sts., Chicago.

The Johnston Textile Building at Charlotte, N. C., is now being occupied, and the following firms associated with the textile industry have removed their Charlotte offices to this building.

S K F Industries, room 1018; Stein, Hall & Co., room 908; W. A. Kennedy, sales engineer, room 910; Allis-Chalmers Mfg. Co., room 1118; Lockwood, Greene & Company, suite 1013-1019; H. G. Mayer, suite 907-909; Stonega Coke & Coal Co., suite 615-619; Travelers Insurance Co., suite 1301-1307; Universal Winding Company, room 1011; J. H. Mayes, suite 1217-1219.

Watt Tell on Honesty

The Twelfth Modern Fable

NOT BY AESOP.

Beans and onions and tomatoes. Potatoes and gravy and more beans. Certainly was a good dinner, but too heavy for hot weather. In the back office a small gray-headed man gazed absently out upon a sun-flooded mill yard from which there arose the dreamy rattle of a mowing machine. Nice stand of grass. The bell in the tower of the mill announced with four quick strokes the end of the dinner hour, and the racket in the weave room grew suddenly from a staccato clattering to a drowsy roar. A vagrant breeze, floating through the window, ringed a cooling circlet around his heated neck. Nice breeze. He blinked a very long blink. Bright sun was bad on the eyes. He blinked another blink so long that his eyes did not open. His head, wagging fore and aft, found a position of equilibrium so stable that the sagging of his lower jaw and the eruption of a gentle snore did not affect it. His left foot, resting on the edge of the desk, slid by degrees toward an electric button on the corner. A casual observer, not knowing any better, would have said that Mr. Watt Tell, superintendent of the Whatsname Mill had dropped off to sleep.

Pot liquor and corn bread and fat meat. Sure was noble grub, but heavy. In the basement beneath the office, Zach leaned against a door post for support. Sure was weak'nin' on the legs. He slid gradually down the post to a squatting position. Boss said scrub the office. Wonder did he mean today? From the mill the spinning frames sang a soothing lullaby. The mowing machine rattled languidly. Upstairs and downstairs a gray head and a kinky one bobbed in unison.

Suddenly an electric bell awoke a wild clamor within two inches of the office boy's ear. Startled into activity, he bounded up the stairs, then tip-toed slowly back down and slipped a piece of paper under the hammer of the bell. "Boss done went to sleep wif his foot on de c'celerator," he soliloquized. "Stop ole racket so she won't wake us up." He slid back down the door post, but straightened up again. "No time to sleep. Gotta press me dese pants fuh de party tonight. High-tone gals frum Atlanta see me wif a good knife-aidge crease, dey eyes shove dey glasses off'n dey nose."

From behind a box of old payrolls, Zach retrieved an electric flat-iron and removing his breeches, commenced a sartorial rite at which every colored boy is a born adept. Sure was lucky he went over to the boss' house dinner time and got that hand-out. White folks lived high, anyway. Awful sleepy weather. From somewhere back in the mill throbbed an hypnotic monotone which beat his eyelids down and goes in search of a lawyer. But how about the other his trousers. The current impression that two-legged animals never sleep standing up is erroneous. Everything was peaceful but the flat-iron. A thin feather of smoke arose from the middle of the shiny place and curled up the stairs.

A cataclysmic crash rocked the office. Mr. Tell's nose had caught a whiff of something burning and he had departed for the mill in a whirlwind of overturned chairs and slammed doors, in the wake of wl ich Zach automatically followed until he noticed the absence of his pants and retreated in disorder. The shiny place was a shiny place no more, but it was something worse. "Sweet spirit, do hear my prayer an' look! Tch, tch." However, there was no use crying over scorched pants. He finished the job and put them back on as Mr. Tell returned wondering how his nose had happened to fool him. When he reached the office he understood. He punched the button on the corner of his desk, but it failed to ring, so he yelled down the stairs.

"Yassuh," said Zach appearing with alacrity.

"What's that burning?" inquired Mr. Tell. "What are you doing down stairs, trying to set the place on fire?"

"Nawsuh, jus' pressin' me pair pants fuh a party. Drapped off tuh sleep an' scotch 'em crisp." He twisted around and surveyed his rear elevation ruefully. "Sweet spirit!"

"Serves you right," said the Super.

"Serves me right, howcome? Heah I is, only got one pair pants, daytime, night time an' Sunday, an' now look." He turned around so the boss could read the flat-iron's signature. "Kin use dese now fuh dress-up pants an' kiver de spot wif my longtail coat. Nobuddy know de diffunce except does I have to do some runnin', but now whut kin I weah around heah? Ain't you got uh old pair—"

"No," snapped Mr. Tell, "and if I had, I wouldn't give them to you. What do you mean, anyway, by beating on the company's time to press pants? I told you to get this office scrubbed. Do you suppose you get paid around here to press pants?"

"Nawsuh."

"Well, then. Serves you right if you did scorch them. That's what you get for doing something you didn't have any business at. You know what you've been doing? You've been robbing the company you work for. Of course you don't figure it that way, but that's the very trouble with the great majority of people. They think it's all right for them to do just anything during work hours that they can do just so long as they don't get caught up with.

"A man comes and applies for a position and the mill gives him one. Well, what does that amount to? It is in effect a contract for him to supply so much work for so much money, and both sides are supposed to live strictly up to that contract. Do they? Well, the mill does, to its side of it. You can bet on that. If they should happen to come short of his pay by so much as the price of a hot dog he sets up a roar that can be heard from here to the place where the jay birds go every Friday, grabs his hat and goes in search of a lawyer. But how about the other side of it? How about the part he is supposed to furnish? That's another thing altogether, ain't it? That's a case of you catch me and I'll catch you, and anything is all right as long as the boss doesn't see him or say anything about it.

"They seem to think that's what the boss is for, and if they don't beat time on him just so often, and give him a chance to get in behind them with a sharp stick, and make it as unpleasant as possible, he won't have anything to do. If they would spend as much time and brains doing their work as they spend trying to get out of it, they would make bet-

ter successes of themselves and wouldn't have to work as hard either. Why I've actually known men that would sit down and go to sleep during working hours just because nobody happened to be there to keep them awake. What do you think of that?"

"Sure is low down."

"I don't suppose you ever did anything like that, did you? No, certainly not. And the hard part of it is that the men who are the worst at it are the very men who should not do it at all, the men who are supposed to set an example to the rest of the help. Anyone who kills time at all is robbing the company just as surely as if he went out to the paymaster's office and got a handful of change and pitched it over the fence into the road, and the higher up he gets the more he throws away. A weaver or a frame hand doesn't have much time to loaf, because if he stops, his work stops and as he is paid by the piece his pay automatically stops, too, but you take a section man or an overseer or a superintendent for that matter, and let him get over in a corner where he thinks nobody sees him, and first thing you know he sits down and begins to nod. Well, if it was just his pay that was concerned it wouldn't be so bad, although there isn't any doubt that every mill in the world loses thousands of dollars a year in this way, but it is the bad example he sets to others. A hand seeing the overseer nodding at his desk naturally thinks he can do the same. and he will do it, too, and feel resentful if the overseer calls him down, because he knows the overseer is no better than he is.

"It isn't only laziness with a whole lot of people, either. Lots of folks that are real hard workers spend valuable time doing things that they ought not to do. Sometimes it is really things for the company, but things that are not important for them to attend to—things someone else should do, or useless things, or things that should not be done just then because there are others more important. Other times they work for themselves when they should be thinking about the company's good. Take your case here, for instance. I told you to get this floor scrubbed because we are going to have some company come here tomorrow, and I want everything to look right, but you go off and press a pair of pants and kill a lot of time at your own business, not to mention the amount of electricity you used up with that old, burnt-out iron. What would you think if I charged you with that electricity?"

"Hit ain't wuth nothin', boss. All de juice I gets down stairs is whut goes to waste, anyhow."

"No it isn't. And that's another thing that causes a big loss to every mill every day in the year. It's the habit folks have of using things belonging to the mill. I suppose it's hard to resist. When a fellow wants a little pinch of this or that and there's lots of it hanging around loose, he just naturally reaches out and gets him a handful for himself, and never stops to think what it costs the mill. I've seen valuable material wasted that way more than I can tell you about. I've seen expensive belting go to make half soles that weren't half as good as regular sole leather would have been at half the price, but they didn't cost the man that put them on anything, and he never stopped to think what the mill was out on the deal.

"I've seen good spindles made into poor screwdrivers, picker sticks go into hammer handles, and roving cans become chair bottoms without any regard to their comparative worth. Of course you can argue that all these things are to be used for the mill anyway, so that it is not a total loss on the mill's part, which is very true; but the point I'm trying to bring out is that the mill pays for all these things twice what they are worth as screw drivers, hammer handles and chair-bottoms, and on top of that the hand says, 'Oh, well, what I'm using would have gone to waste, anyhow.' When I was a small kid I used to hang around an ice factory that had a lot of watermelons in the storage room and whenever the engineer got hot and thirsty he would go in there and take down a big piece of meat and break open a watermelon with in. Then he would go to the boss and tell him a piece of beef fell on a melon and broke it and ask permission to eat it. What do you think of that?"

"Whereat did you say dat wuz?"

"Never mind, I'm not going to tell you. Folks like him, when they are looking for a little waste to use for their own purpose, if they don't see any real waste handy, will go and make some. A bobbin of yarn makes a very good prop to keep a door open with, but it's a pretty expensive one for the mill, even if it does get the use of it as a prop. Why once I knew an overseer that kept his office door open with a speeder bobbin stuck in the crack between the hinges, and everybody that came by and touched the door, pinched the bobbin hard enough to crack it and I'll bet that man ruined more bobbins than he was worth.

"Then there's another loss that mills have to stand for, and that's things that folks take home with them. They don't think there's any harm in it. There are plenty of people who wouldn't steal a dollar from you if it was the last dollar in the world, but who think nothing of taking out electric lights, soap, nails and screws, and odd pieces of lumber for the garden fence and slasher waste to string the beans on, not to mention cord and cloth, simply because there seems to be plenty of it around and they lose sight of the value. A yard or two of cloth here and yonder for the old lady's dress or the old man's shirt won't break a mill, and to do them credit, most mills don't say anything about it if it doesn't get too bad, but a yard or two all over the place means an aggregate loss that amounts to a great deal more than most folks think for, and to tell you the truth, all these things taken together very often mean the difference between profit and loss for the firm you look to for your meal ticket. Did you ever think of that?"

"Nawsuh."

"Well, just remember that there are as many different ways of stealing as there are of telling a lie. You don't have to come right out with a lie to tell one, you can give someone a wrong impression sometime or simply leave him with the wrong impression he already has and tell him a lie just as surely as if you had made him believe the moon is made of green cheese. You don't lie or steal, do you? You're a member of the church, ain't you? Didn't you tell me the other day you were a deacon?"

"Better'n dat now. Done git so high dey lets me pump de organ in de white folk's ch'ch."

"Well, then! Just remember that folks in our high position have to set an example to other people that don't know as much as we do and have to live up to the rule of noblesse oblige. Ever hear that word?"

"Yassuh."

"Then think about it while you scrub this floor and don't

let me catch you pressing pants or going to sleep any more. I don't kill any time myself and don't want anyone else to."

"Nawsuh. Boss sure was wound up. Grub on the white folks table musta had lots of talk cooked up in it. What got by to the back steps didn't have nothin' but sleepyhead to it." Zach's mop and the afternoon progressed leisurely. The Super. made a round through the mill and came back to the office. Stoppin' time dragged up as slow as a kid comin' for a lickin.' Mr. Tell laid his finger on the push button, but got no result.

"Zach!"

"Yassuh, been right heah all de time."

"What's the reason this bell won't ring? You got it plugged so you can sleep?"

"Nawsuh. Right after dinner when you was a-sittin' heah doin' a little heavy thinkin' like, yo' foot was restin' easy on de aidge of de desk an' hit slip down over de button, so I puts me a piece paper under de bell so hit won't bother you. Dat's howcome."

Mr. Tell coughed. "I see. Well, I had a bundle of harness shafts here by the desk. What became of them, do you know? I'll bet you threw them out."

"Nawsuh. You say dem things wuth money, so I took 'em out to de supply room. Folks takes things out too bad, so when I sees 'em I moves 'em from somebody's temptation. Little slats makes awful handy chicken coops."

"All right. I'm going home a little early this afternoon. If anybody wants me you call me up."

Zach mopped up the last square foot in front of the paymaster's office and took a longing look out of the window. Sweet spirit! There was the Super. going out of the side gate with the slats under his arm. Chicken coop, look out. The paymaster rattled a few extra dollars into a drawer and slammed the safe door.

"Cap'n, whut's dis heah noblessy obleegy mean?"

"Noblesse oblige? Why that's a French slang word that means folks high up have to act that way. Why?"

"Nothin'." The bucket and mop rolled down the stairs to the basement. "French word, I gotcha. All you means is, what's good for de boss ain't good for de office boy, but you'se a liar. Cullud gals frum Atlanta, watch my step. Anybody wants Zach twix now an' stoppin' time, please call me up." He reached for his hat.

"What it means, Zach," called the paymaster, "is that big folks like you and the Super. have to set a good example to the hired help."

"Ain't it de truth," agreed Zach, as he slipped out of the back door.

Human Relationships in Industry

BY W. M. McLAURINE.

The Overseer's Responsibilities.

In the preceding conference, "Leadership Qualifications for Overseers," were discussed. Some of the objectives of this conference were (1) to get the men to definitely express the characteristics that they like in men; (2) to get these characteristics in a visible tangible form for the men to study; (3) to get the men to use them as a mirror in which they could gaze and determine their weaknesses and become the great leaders that industry needs. If our line of procedure should stop at this point, I fear that we would stop too soon. All of our discussion in that conference was centered around the characteristics of men with whom we like to work. One of the chief characteristics of leadership is knowing just what our responsibilities are; in knowing the details of the daily duties demanded of us. For that reason, I think it would be wise for the group to analyze the responsibilities of the overseer. If objectives are desired, the following may be considered:

1. To enable the overseer to concretely and thoroughly analyze his job.
2. To enable the overseer to have a visual perception of it.
3. To enable the overseer to check his responsibilities to determine whether or not he is properly discharging them.
4. To enable the overseer to properly plan his work so that it may be efficiently executed.
5. To enable the overseer to plan for his leadership qualities to assist in the execution of his duties.

I think in the analysis the leader should proceed either with questions or cases. In the discussion, responsibilities will be developed. These may be listed in the order in which they are developed. After all duties that are in the minds of the group have been developed, it is a good idea then to analyze the duties and classify them under certain headings.

This work is of value for three reasons. First, because it teaches the men to think and plan systematically; second, a systematic study and arrangement is more easily remembered than one that is scattered and not properly grouped; third, in making this second study, other duties which were overlooked in the first study will possibly be developed.

There are several groupings possible, but it occurs to me that either one of the two following can be taken advantageously for the group.

Inasmuch as the duties of an overseer are management, supervision, and instruction, and manifest themselves in the handling of men, machines and material, one of these should be taken.

It is supposed at this point that the leader has on the black-board or chart all of the duties listed, without reference to any arrangement other than the sequence in which they were developed. I have taken in this conference the headings, "Men," "Machines," "Materials." In a later conference on Planning, I have taken "Management," "Supervision," "Instruction."

The suggestive outline on overseer's responsibilities follows:

OVERSEER'S RESPONSIBILITIES:

I. MEN.

1. Interviewing applicants.
2. Hiring help.
3. Instructing help.
4. Placement.
5. Supervision.
6. Keeping interest alert.
7. Safety.
8. Health.
9. Selecting sub-executives.
10. Orders { transmitting. giving.
11. Records and reports.
12. Suggestions.
13. Working conditions
14. Maintaining discipline.
15. Transfer, promote, discharge.
16. Cooperation.

II. MACHINES AND EQUIPMENT.

1. Layout and equipment.
2. Efficiency or output.
3. Care and repair.
4. Safety.
5. Determining operations or methods.
6. Wear and tear.
7. Supervision.
8. Records and reports.
9. Repairs { a. Storage. b. Distribution. c. Use.
10. Cost of operations.
11. Knowledge of operations.
12. Set up standards.
13. Plan routings and operations.
14. Study machines.

III. MATERIALS.

1. Raw Stock:
   a. Care and storage.
   b. Condition and amount received.
   c. Kind of stock.
2. Stock in process.
   a. Routing.
   b. Care in processes.
   c. Care between processes.
3. Finished stock.
   a. Amount and quality.
   b. Disposition.
4. Waste or seconds.
5. Supervision.
6. Production { Capacity. Normal. Average.
7. Defects possible & causes.
8. Costs.
9. Records and reports.
10. Suggestions.
11. Planning.
12. Ability to recognize materials, properties, etc.
13. Antiseptic conditions.
14. Give clear and accurate orders.

I have tried to impress upon the leader in all of these conferences that the content is not intended to be complete. Content is so complex and varied, that I have only used enough to indicate the method and get the group to fill in the content. Some of the subject matter introduced may be irrelevant, if it is, simply discard it and put in that which is of value. I would consider myself very presumptive, if in all of these conferences, I should attempt to indicate the content. I am not capable of doing it. If I were capable, I would not indicate it, as I would rob the conference of its chief value, which is the group's developing subject matter out of their own experience and intelligence. Where the individual group develops an outline or system, it is of value to them, because it came out of the environment in which they work.

The following test on foremanship was taken from Shefferman's "Employment Management." The questions asked indicate another group of headings which may be used in grouping the responsibilities of overseers.

Organization *Rating*

1. Have I located the real opportunities afforded by my position? (Am I off on side lines, looking for the surface errors of subordinates?)

2. In turning these opportunities into realities did I surround myself with able men? (Do I surround myself with a lot of "cheap" second raters, so that I can have a better chance to be the whole thing myself?)

3. Has each of these men his job and the authority to proceed? (Does confusion exist, with repeated calls coming in for instructions?)

4. Are my subordinates securing from me constructive directions? (Do they find me a putterer over details, a laggard whose non-decisions holds them up?)

Planning

5. Are difficulties foreseen and their effects provided for in advance? (Does "First one thing, and then another" continually trip me up?)

6. When new projects are decided upon, do I draw up careful outlines of procedure? (Am I busy settling things piece-meal as they come?)

7. Am I doing every day some real constructive thinking? (Am I too harassed and worried to concentrate?)

8. Do I push the work? (Does the work push me?)

Incentives.

9. Do I appreciate generously the results obtained by others? (Do I belittle their efforts and push myself into the lime-light?)

10. Am I developing and training men constantly? (Am I always threatening discharge and telling how incompetent my co-workers are?)

11. Can I keep faith with my organization, permitting each man his due freedom and reasonable leeway for errors? (Do I break the spirit of my men by arbitrarily taking things out of their hands?)

12. Am I regarded as a friend and co-worker? (Have I dwarfed and antagonized men,—instead of being a dispenser of the fair deal—been a dispenser of "bunk"?)

Supervision.

13. Is my judgment based upon the sound data which vitally affects my business? (Such sound data lacking, am I left in the dark?)

14. Have these sound data been properly summarized and reduced to graphic form for my use? (Does the slow wading through much irrelevant matter to get what I want cause me more bother than help?)

15. Do I recognize excellent results when such are produced? (Am I a rule-of-thumb man without carefully worked out standards?)

16. Have I a close grip on the essentials of my position? (Am I more filled with suspicions than facts?)

I have found it of value for each man to have a copy of this test to take home with him, or paste over his desk so that he may comprehend all of the significance contained in it.

If the group has carried out all of the suggestions called for in the series of conferences thus far, quite a bunch of material should be in evidence. The dignity and importance of the overseer's job should be making itself felt. The great demand of business today is facts and results, not generalities and excuses.

The world needs men who are alive, alert, and ready to proceed with intelligence in their work. I believe that this conference has a tendency to develop this kind of man. Brain work is more fatiguing and complicated than hand work. When minds become satisfied, they begin to die; when they can not get a new idea, they are dead.

How is your mind? Are you dead and don't know it?

This treatment will bring you back to life if you are dead, or it will begin to put new convolutions in your brain, if it is shriveling. The brain cells will dance with glee and the grouches and glooms with their sombre robes, will flee before the joys and happiness in their radiant hues.

Thomas Skinner & Company, 330 Gresham House, Old Broad Street, London, E. C. 2, England, have issued "Skinner's Cotton Trade Directory" for 1924, which is a comprehensive reference book devoted primarily to the industry in Great Britain. Valuable lists of cotton manufacturers, agents, dyers, bleachers, finishers, etc., are given, as well as other pertinent information relating to the industry. The price of the book is 1 pound, 5 shillings, per copy.

Machine Calico Printing

BY WILLIAM B. NANSON.

Defects Incidental to Machine Printing (Continued).

"Scrimps"—Scrimps and doubled edges are simply creases in the cloth which pass through the machine, and by preventing the color from reaching the underlying parts of the cloth show up as white places in the finished goods. There is another type of "scrimp" which makes bad printing though the cloth is only slightly "crimped" or cockled; this is caused by holding the goods too slack on the drying cans before printing. They dry up "cockly," and take a poor impression. The goods must be dried up perfectly smooth before printing and then at the printing machine scrimp rails and an efficient back tender should do the rest.

Uneven printing—Uneven distribution of the color paste is liable to happen under many different conditions. It shows itself in various ways, in any of which it may be accounted for either by some fault in the goods themselves, or the printing rollers, or the color paste, or in the way the printer handles the machine. If irregularly shaped, light granular-looking patches become developed on the cloth when it is steamed or dyed, it may be blamed in most cases to the presence of lime remaining in the goods from the bleaching. All lime stains occur at irregular intervals and can therefore be identified.

If it happens in the printing that one edge of the cloth is consistently darker than the other the unevenness is caused by the pressure of the roller against the cylinder being greater at one end of the roller bearing than at the other. If the center of the piece is either darker or lighter and running up the full length of the cloth some inequality in the lapping is to blame, or it may be, in the case of long rollers or small light rollers, to their springing in the center; in either case the remedy consists of packing the lapping by either adding or removing a few layers or strips of calico to it, so as to increase or decrease its thickness in the middle.

Uneven effects of a similar character but not so regular in appearance may be caused by feeding fresh color paste into the box all at one point instead of spreading it evenly across the whole width of the box from end to end; when color pastes froth much, as some colors are liable to do, or are likely to decompose or dissociate, it is most important that the box should be replenished as evenly as possible, in order to keep the color of the same strength and tone throughout the whole mass.

Unevenness is also to be feared and guarded against in colors that are badly mixed, or which separate out in the course of working. Of these latter, pigment colors are probably the worst; the heavy metallic oxides of which they are largely formed are very liable to settle out, specially if the printing color is thin, and it not infrequently happens that, in mixtures, one constituent will settle more rapidly than the others, with the result that the color is both weakened and altered in tone and shade. Therefore, this settling out of the color must be avoided by stirring up the color paste frequently; this must be done both in the color box in the machine and in the tub which contains the supply.

When a roller has been polished a good deal in one spot to work out some cut or scratch, that particular spot will give a weaker impression of the pattern than the other parts of the roller; this because the engraving at that particular spot has become reduced in depth, or the polishing and burnishing may have been so severe as to cause a "low place" on the roller, so that the doctor fails to clean it properly, thus allowing a smudge of local "scum" or color to be transferred to the cloth. Weak and uneven impressions are also due to an unequal depth of the engraving on different parts of the roller, but it must be always remembered that defects arising from this cause occur at perfectly regular intervals, corresponding to the circumference of the roller and are therefore easily placed.

Another factor in uneven printing is the slippage of the printing roller on the mandrel, but this I have already discussed under the head of "Mandrels" and "Rollers" so will not repeat it here.

The defects arising from the color paste itself depend upon its thickness and the nature of the mordant. If the color is too thick, it cannot enter readily into the lines of the engraving; if too thin, it runs and spoils the design. A medium between these must be found, which long experience alone can teach, and which varies, not only with each kind of fabric—the color being thinner in proportion as the texture is fine—but also with each kind of design; for the more the design is charged, the thinner the color must be. For this reason, designs printed on a colored ground, can only be well done with gum colors, as those with starch cannot, without being decomposed, be diluted beyond a certain limit, which is not adapted to obtain the desired object.

Again, colors thickened with gum have the defect of producing during printing a great deal of froth, which, if not removed as fast as it forms, becomes fixed upon the fabric, and only produces feeble colors, as it contains but little mordant. Starch colors froth up very little and this may be easily prevented by adding a little sulphate of lead, which appears to act in dividing the mass.

The physical causes of the defects occasioned by the drying of the pieces after printing arise from either excess or defineiency of heat, and the stagnation of the air. The drying must take place as rapidly as possible in order to prevent the colors from spreading on the cloth, and spoiling the design, but the heat must not be excessive or the colors will become encrusted and flake off the fabric. This is particularly the case with those prepared with gum. A less degree of heat is maintained when strong iron mordants or steam colors are used and especially ground colors, which are the more brilliant the more slowly they are dried. In any case the air must be continually removed and a good circulation kept up in order to carry off the vapors of water and acids which are disengaged from the printing processes. I might say here that the atmosphere of the printing shop should never be allowed to cool under 65 to 70 degrees F. and it should never be too dry. The temperature and moisture should, therefore, both be regulated with the aid of the wet and dry bulb thermometer as they exercise a great influence upon all printing processes, and

more especially upon the combination of the mordant with the cloth. In the course of the dessication a portion of the acetic acid, which most mordants contain, evaporates with the water, and subacetates are formed which combine with the goods in proportion as the solvent principle escapes; the water, as it evaporates, carries off acetic acid with it, and thereby aids the fixation of bases. These remarks are peculiarly appropriate to delicate impressions by the cylinder printing machine where the printing and drying are both rapidly effected by the one continuous operation.

In some styles of printing the strong mordants are apt to produce patches, being thickened with pipe clay and gum, which obstruct the evaporation of the acids. They are therefore apt to remain, and to dissolve a portion of the mordants at their immersion in the blue vat, or at any rate in the clearing bath. In such a case a hot and humid air is indispensable, after the application of the mordants, and sometimes the goods so impregnated must be suspended in a damp chamber. To prevent these resist pastes from becoming rapidly "crusty," substances apparently useless are mixed with them, but which act beneficially by their hygrometric qualities, in retarding the dessication. Oil also is sometimes added with this view. It is often observed that goods printed upon the same day and with the same mordant exhibit inequalities in their tints. Sometimes the color is strong and decided in one part of the piece, while it is thin and dead looking in another. The latter has been printed in too dry an atmosphere. In such circumstances a neutral mordant answers best, especially if the goods be dried in a hot room, through which humid vapors are in constant circulation.

Preparing the Color Pastes for Machine Printing.

I might say here that the application of most of the modern coloring matters requires the supervision of a chemist rather than that of a mere color mixer; and in fact all the operations of a calico printworks ought to be under scientific management. The conditions under which a color is prepared, the proportions of its ingredients, the order in which they are added, and a thousand other apparently insignificant details all affect the result. Then again, while the result itself may be satisfactory the cost of securing it might be too great; so that in all cases the services of a chemist are advisable, if only on the grounds of economy, to say nothing about the quality of the work turned off.

It is not my intention to give any recipes in this article for making the various color pastes for printing—that may come later—but at this writing I shall confine the discussion to the methods used and the materials employed in the thickening of the various coloring matters and mordants used in cylinder machine printing.

The substances used for this purpose may be divided into two distinct classes: (1) Those which are used solely as thickening agents and which are afterwards removed as completely as possible from the cloth; and (2) those which are thickening agents and fixing agents combined, and are allowed to remain on the cloth, forming as they do an integral part of the finished color.

The function of a thickening belonging to the first class is simply to act (a) as a vehicle for carrying the color to the cloth, and (b) as a preventive against its spreading, by capillary attraction, beyond the limits of its allotted space in the pattern. It ought therefore to possess no affinity either for the color or the mordant with which it is mixed, otherwise, on washing it out of the cloth, most of the color would be removed with it.

The following thickening materials are the ones in most general use:

1st: Starch, flour, gum tragacanth, gum Senegal, gum Arabic, dextrin and other artificial British gums, with or without the addition of China clay, etc.

2nd: Albumen, casein, lactarine, and glue.

There are other substances such as linseed mucilage and Irish moss that are sometimes used for special purposes, but they are in no way *essential* for any style of work, and can be replaced in all cases by one or the other of the many artificial gums.

Wheat starch is probably the most largely used of all the thickening agents employed in calico printing. It is not only cheap but it is not easily acted upon by colors and mordants; moreover, it can be used for a larger variety of purposes than any other thickening. It gives a good, sound workable paste which keeps well and which may be used alone or mixed in any proportion with other thickeners.

Generally speaking, it may be said that the greater the weight of the thickening material contained by a given color, the lighter will be the shade it will ultimately yield; and, conversely, the greater the weight or quantity of water the deeper will be the shade. Starch paste containing 12½ per cent of wheat starch forms a more or less aqueous thickening, which, despite its fairly thick consistency, allows the color to penetrate well into the body of the cloth, and thus yields shades that are fuller and more opaque in quality than those given by any of the gums (except tragacanth) which only thicken from one to three times their own weight of water.

Starch paste prepared with water alone is usually too adhesive or "sticky" to work well in machine printing; it adheres too tenaciously to the printing rollers, and, if it is at all thick, it frequently "gets by" the cleaning doctor, unless great weight be put upon it, a practice which tends to wear down its edge quite rapidly. It also becomes set into a stiff mass when cold and has to be warmed over again before it can be used. These disadvantages can, however, be obviated by adding a small quantity of some vegetable oil to the paste. This renders the paste more emollient without reducing the consistency of it and makes it possible to work a very thick color paste without much difficulty. The oils which are usually used are the cottonseed, the olive, or the castor oils and the quantity used is from 25 to 50 per cent of the weight of the starch used.

When making starch paste, the starch should be first of all stirred up with cold water and made into a creamy paste; the oil should then be added and the whole mass should then be boiled until it thickens and begins to go thin again. Just at this point the boiling should be stopped and the paste should be cooled down. I might say here that the mixture should be stirred continuously both while being boiled and while cooling off.

If dyewood extracts or solutions of the various dyestuffs are thickened with starch the same method is used—the starch is beaten up with water, the dyestuff and oil is added, the whole is boiled and cooled off and then before removing from the mixing pan the mordants are thoroughly stirred in. Organic acids (principally acetic) are sometimes stirred in with the mordants as solvents but their

presence makes no difference to the methods of working.

For most purposes a color paste containing from 12 to 15 per cent of starch is plenty thick enough, but it must be remembered that the thickness of the paste must be made to vary with the depth of the engraving in the printing roller and the style of the work.

As a general thing a paste containing 12 to 15 per cent of starch would be quite thick enough, but if the engraving is coarse and a clearly defined impression is required, or, for all delicate designs if not too lightly engraved, the quantity of the starch may be increased to 20 per cent, but on the other hand, in solid printing—that is, padded styles —the starch may be used at as low a percentage as 6 to 8 per cent, a heavier percentage than this being liable to make the printing appear thin and bare.

A good wheat starch should not contain more than 15 per cent of moisture or 0.5 per cent of ash. In all other respects its value as a thickener can be decided only by practice. A sample of the starch to be tested may be taken and made into a paste; its color and viscosity are then noted and compared with a sample of the starch in use, which must have been boiled up at the same time and under the same conditions exactly. A pale alizarin pink and a pale methylene blue are then made up from both starches and printed, steamed and washed together; the results are then compared, and the best results will denote the better starch. A portion of each of the two pastes is then allowed to stand for a few days and then tested for acidity, using litmus paper for this purpose; after which it is examined and its consistency noted to see if it has retained its original condition or whether it has broken up into a rough looking mass of curdy lumps floating in a watery medium. The thicker and whiter the paste may be made from a given weight of starch, the brighter will be the colors printed from it. Again, the longer and better the paste will keep without turning sour and without breaking up, the better the starch will be as a thickener.

Wheat starch is the best thickener for dark shades of all coloring matters. It is equal to but no befter than gum tragacanth but it is much cheaper and quite as good for styles where a soft finish is not required. Wheat starch certainly does impart a rather harsh feel to the goods when printed in heavy patterns as in certain cretonne designs; however, in actual practice this harsh defect is more or less overcome by mixing the starch thickening with gum tracaganth in varying proportions; while this may be quite as thick as starch it contains about 85 per cent of water and therefore does not stiffen the cloth to anything like the extent that the starch does.

Fine patterns in fast colors are almost always printed with wheat starch for a thickener unless the colors used are pigments, Indigo and other alkaline colors, or mordants for madder dyeing.

Corn starch is seldom used in calico printing; it is, however, used for thickening alkaline mordant (aluminate of soda) and it is sometimes mixed with dextrin for indigo and sulphide printing colors.

Both rice and potato starch make unstable paste which are unsuitable for color pastes for printing.

Wheat flour contains both starch and gluten which latter substance renders wheat flour unsuitable for use with many of the modern dyestuffs and their mordants. It finds however, its greatest use as a thickener for the acetates of alumina and iron, which are still largely used for the production of "madder" reds, chocolates and purples, styles which were formerly more prevalent than at present, though where the best and fastest work is required they are still printed in large quantities. For these "madder" styles wheat flour is eminently adapted, it is a powerful thickener, forming a soft full paste which allows the mordants to penetrate well into the cloth, and yields, on dyeing, dark rich colors that are remarkable for their evenness and bloom.

With the "ice colors" (diazotised paranitraniline, etc.) wheat flour gives darker shades than most other thickenings, and possesses the further advantage of producing the most stable printing pastes, although no "ice color" pastes will remain in good condition for many hours, except in the coldest weather

It is quite customary to mix flour with starch or with gum tragacanth for certain styles according to the pastes required and it is rarely used alone in the present days.

The tests applied to wheat starch to determine its value may be applied to flour as its printing value depends upon the same qualities as are found in the starch.

Gum tragacanth or "gum dragon" is the dried exudation of *astragalus gummiger,* which grows in Lebanon, Syria, Central Asia and America. The gum occurs in two forms: (1) leaf gum in small, irregular curved strips with a crinkled surface; and (2) vermicelli gum in cylindrical sticks.

It varies in color from white to yellow or brown and grey. When boiled with water it gives up about 60 per cent of its weight capable of being removed by filtration. With cold water it gradually swells and forms a thick jelly-like mass which forms a partial solution on warming, settling to a jelly when cooled again. Its solution has a very high viscosity, greater than that of gum arabic and only exceeded by Iceland moss. It does not form a clear jelly, but is somewhat opaque with white specks scattered through it. These consist of oval cells containing some starch granules similar in appearance of those of rice or corn.

The water content of tragacanth varies considerably, rising as high as 26 per cent.

The best and most expensive quality of gum tragacanth is almost white, very translucent and free from sand and dirt, it ought to dissolve entirely in water and form a thick smooth paste, with at least twenty times its weight of water. When boiled the mucilage becomes thinner and smoother; and if boiled under pressure the solution becomes very thin. In common with all natural gums tragacanth varies in its behavior towards tannic acid, metallic salts and alkalis. The best kind of gum tragacanth for calico printing is that which does not become gelatinous with tannic acid and the other substances mentioned above. Most qualities will mix fairly well with a dilute alkali but the best quality is converted into a ropy mass by strong solutions of caustic soda, while the cheaper and poorer qualities, yellow in color and containing a comparatively high percentage of foreign matter, can in many cases be mixed perfectly with soda sufficiently strong to discharge a tannin mordant. It varies considerably, however, in this respect, no two seasons' deliveries being quite alike in their behavior towards alkalis.

Gum tragacanth is one of the most indispensable thickening agents possessed by the calico printer. It may be mixed

(*Continued on page* 1177.)

What Other Men Manage With

BY R. A. SONIAMAN.

Carded or Combed Stock.

After leaving the card, the sliver travels along either of two avenues: that of carded or that of combed stock. Obviously, when on a visit to a mill making fine combed goods or yarns, an operating executive is usually deeply interested in the mode of combing. In some plants both carded and combed work is made. In such a case, the general line of procedure is indicated in sketch, Fig. 1, A being the combed and B the carded stock.

It is interesting to note how the two slivers—combed or carded—are differentiated when they leave the cards en route on their divergent courses. This is, what means or measures are taken to keep the two from being mixed. Usual-

Fig 1

ly the cottons themselves are sufficiently contrasted by color to act as a sort of mixture preventative, American cotton, which is used extensively for carded work, being white, and Egyptians, which comprise the bulk of combed stock, being some shade or tint of brown.

There seems to be a tendency, furthermore, in some quarters, to use a fine grade of Saks in place of Sea Island, more definitely confining the white cotton to carded work, and dark for combed.

One good method of marking the two types is that of using cans of 2 different colors at the cards, one color denoting the product to be carded only, the other color taking care of the combed work. If it is not desired to go to the expense of painting the entire cans of the present equipment, a 2 or 3-inch band could be striped around the top part of the cans. Some mills, that keep their complement of sliver cans down to a bare working minimum, run a crayon mark across the top coils of the full cans to distinguish the two types, but this is not always a dependable method where artificial light is more or less necessary.

Assuming that a mill making both classes of work is being visited, it may be advisable to follow first the course of the combed stock as it leaves the card, later meeting with the carded stock at its entree to the drawing process.

The first machine, then, will be the sliver lapper, or doubler, as it is sometimes termed, the machine which combines 20 slivers more or less into a lap. Before the ribbon lap machine was as widely adopted as it is today, a drawing process was often inserted between the card and the sliver lapper. The modern tendency, however, appears to favor the routing as shown in Fig. 1. Are the tables of the sliver lappers in the visited mill rectangular, V-shaped, or is the type that with no table at all, the cans being placed around the back of the machine and the slivers going directly to a roller behind the draft rolls?

Is there any trouble with single? Break an end and see where it gets to before the machine stops. A question as to the instructions given the workers in regard to singles might elicit an interesting response.

Are the machines equipped with full lap stop-motions? Are they in good working order, and do the workers find them an advantage in the routine of their work? If there is no full lap stop-motion, are the laps kept at a uniform full size, or are they taken off anywhere from one-half to full? What should be the right size?

Are the laps made neat and compact, or are they soft and mushy? What about the selvage? It is surprising how bad selvages can be made, particularly on the older machines. Are the laps sized, and who does it? How often? Is a record kept of these sizings? What is the variation? When the laps are doffed, where are they stored? Are the speeds of the sliver lappers and ribbon lappers so arranged that each sliver lapper can handle one ribbon lapper?

And what is the per cent of stoppage for the sliver lap machine? Is the stoppage in any way influenced by the cards not being able to furnish enough sliver to keep the machines going fully? What can be considered the normal efficiency? How do you, Mr. Visitor, regard this efficiency, good, bad, or fair?

What is the system of weighting the top rolls? Does this system agree with what you have found as suitable? Are the same weights used which the machine builder supplied, or has your friend changed them as a result of experimentation? Of course, the draft of a sliver lapper is small, but just what is your guide's idea of exactly the most suitable one.

How are the machines laid out so that the product from the cards is easily placed and the full laps readily disposed of at the ribbon lapper? How many machines can an operative attend? What is the practice in regard to machines a worker attends—just sliver lappers, or mixed? Sliver lapper and Ribbon lapper together? What is said about the advantages of each method? What is the system of

cleaning and oiling the machines? How are the repairs looked after?

As to the ribbon lapper, the same line of quizzing that related to the sliver lapper is appropriately applicable. Take a look at the laps turned off by the nearest machine. The draft is usually proportionate to the number of laps fed, but just to see if any change had to be made because of a certain desirable weight for the comber, or some similar reason, ask a question.

By the way, have you noticed the width of the laps? And what about the weight? Are the laps sized regularly? How are the laps stored. Some mills make a practice of storing surplus laps directly on the floor, but this is a procedure which obviously is not commendable. Before leaving the ribbon lapper, it might be well to ask your fellow operating executive what he thinks of the ribbon lapper as a necessary feature in the scheme of cotton organization.

Coming to the comber, we arrive at one of the most complicated machines as yet devised in card room machinery. When one bears in mind that the comber not only functions as its name connotes, but that it also removes impurities left in by previous processes such as leaf and nep, as well as removing short fiber, some idea of its importance is obtained. The comber itself is in a stage of gradual improvement as will be seen when one recollects the little 9-inch 200-250 grain lap treated some years ago compared with the general practice today of using a 12-inch 600-800 grain lap.

How many nips per minute? Naturally, as the production question is one of grave concern for the management the matter of nips per minute is an extremely interesting one. One of the largest spinners of thread have adopted 100 nips per minute as their standard.

Are there stop signals to show when the machine has entered the non-producing class? Ask to have a lap pieced just to see whether things are done as you do them. Does the attendant carefully unroll the residue of lap, trimming the ends of the old and new lap at joining?

Note whether all the laps are permitted to run out even or whether the system prevails of running one lap out at a time. It is no doubt safe to say that the majority of mills prefer that the laps shall not run out together, but the writer was recently in a modern mill in which the system was to let the laps run out evenly on the combers. The machines were stopped to piece in the full laps!

Is there any trouble experienced with the comber tenders letting a lap tail run out now and then, spoiling thereby top comb and half-lap needles? This was a very common complaint in eastern mills where night shifts had to be put on to meet the demand for production.

How does the web look in the pans? Clean and free from slugs? Does it look like a fine transparent film, or is it punctured here and there? What about leaf? "Why, you don't expect the comb to do the work of the card, do you?" an old mill executive used to say. But as a matter of truth, the comber is, in general today, expected to remove some particles of leaf that have slipped by the card.

It is well to inquire about the neps. "Seems to me sometimes as if every single nep made it a point to turn sideways and shoot through the needles," one overseer wailed when he was called down for neppy work.

The amount of overlap is also a matter for investigation. "Give me a light lap to work on and let me have a large overlap, and I'll give you a first-class combed product," emphatically ejaculated one old-timer; whereas another equally successful veteran prefers a medium overlap. In view then of the varying practice in regard to overlap, a few remarks on this subject by your friend may be enlightening.

Another problem that often causes serious perturbation of mind of overseer and superintendent is that of the regulation of waste. How much to be taken out? 5-10-15-20-25 per cent? All depends upon the product into which the cotton goes and upon the grade of cotton. Some cottons naturally contain more waste than others, and it is an absolute necessity to remove a large percentage in order to get a fair product.

Take a pull of raw cotton. What do you consider the average length of fiber? So and so, you say? Very well! Now hold this pull of cotton firmly in one hand. Pull out carefully the fibers protruding beyond the main pull. Lay

Fig. 2

these fibers on a piece of black cloth. Pull again, and continue so until the whole pull has been done away with, placing each drawing of fibers below the previous one. The fibers in this arrangement will look somewhat like a xylophone. See the sketch, Fig. 2.

As will be noted, there is a decrease in the length of the fibers as the wad is reduced, and some conception of the amount of waste to be taken out will be arrived at. The writer is acquainted with a buyer of cotton who has become an expert in estimating the amount of waste that will have to be taken out of a certain lot of cotton. He does not lay out the fibers as in the sketch, but he retains the short fibers extracted in stapling and compares the amount with the cotton in the completed pull.

There is a device on the market for dissecting a pull of cotton and as it makes a better job, of course, than that drawn out by hand, a fairly accurate idea of the amount of short cotton that will have to be combed out is obtained; furthermore, a more dependable representation of the average length of the fibers may be had. (See page 1033, August COTTON.)

There is a difference of opinion as to just how much waste should be removed even though the same grade of cotton is used. The writer has for years handled fine yarns which have about 15 to 20 per cent taken out at the combers.

Another question to be asked is: What becomes of the comber waste? Is it sold, or re-utilized? Has anything ever been tried about working up the comber waste into a side-product so as to enable the firm to get a better return than that obtained from the sale of the waste?

How often is the per cent of waste taken out at each comb checked so as to ascertain whether each comb is doing

its duty properly? It is surprising that in some places, once the machines are set, no attempt is made to follow them up. Once a month gives a good idea of what the machines are doing.

If the waste from the needles is combed off directly into waste cans, what measures are taken to prevent comber attendants from getting injured when they pack down the loose waste? Some firms having this type of waste receptacles provide a stick, and insist that the waste must not be pushed down by hand under penalty of discharge.

Is any trouble experienced with the sliver as it moves along the table? Is there an excessive number of ruptures? Is the use of whiting a habitual affair or is it only needed when General Humidity is on the warpath? Are the breakages due to an abnormal table draft? By the way, how are the drafts throughout the machine proportioned?

Who sizes the comber sliver and how often is it done? What is done when abnormal sizings appear? What are considered abnormal sizings? Who established the boundaries which separate suitable from abnormal sizings? How were these arrived at?

Are spring bottom cans used for the product from the combers? What is your friend's opinion of them? The writer sometime ago visited an old established mill still doing a successful business even though some parts of the equipment appeared somewhat antiquated. Looking in vain into the cans for the spring bottom, a question was asked of the assistant superintendent about them. "Oh, certainly! I think they're just the thing, but—" and with a suggestive shrug of the shoulders and an expressive jerk of his thumb toward the superintendent's office he relapsed into silence.

In connection with the settings of the comber, what regu lates the settings in the mill you are visiting? Some interesting replies are to be expected in response to this query. Is there ever any variation in the cotton which requires a change in the settings? Who changes the settings when this is necessary? If it is a comber man who gives his entire time to looking after the combs how does he know what settings to change? Has he ever been taught the relations of settings to the stock or does he set by rule of thumb or past experience?

What is the ruling for keeping the needles of the half lap in good trim? For lack of a periodic examination of the needles of the top comb and half-lap, the writer has seen some combs pretty badly equipped for the important work that they have to perform. Are the needles sent out for resetting? Or is the plant big enough to have a needle setting department of its own?

When one speaks of help, the ordinary connotation of the word leaves one with the impression of any class of workers. So when visiting elsewhere take a moment to look over the comber help. The writer has been in mills where the comber attendants were all middle-aged women of English, Scotch and Irish extraction or nationality; in one place, the workers on the combers were all black; in another, all Portuguese. Again, some mills in centers where labor is heterogeneous as far as nationality goes, there were Poles, Italians, French, Armenians, and divers other peoples. Another mill had comber tenders of both sexes, and in one eastern mill, only male workers were permitted to work on the combers. It is interesting to hear the various expressions in regard to the efficiency of the workers when in the grouping above mentioned. The writer has handled people of both sexes and many nationalities and, generally speaking, he has found where workers are properly instructed and coached, efficiencies run pretty much the same.

And, by the way, are there instruction cards giving specific instructions regarding the work so that some approach to uniformity will prevail?

How many machines can a worker attend? The writer has found that there is quite a difference in the number of machines allotted per worker. Obviously, many factors enter a consideration like this, nips per minute, class of cotton, wages paid, etc.

What is the arrangement of the combers: are they lengthwise the room, or across its width? Are they crowded together so that there is barely room for an attendant to move in, or are they laid out so as to facilitate the movements of workers. What effect has either layout on the expense of the room?

When combers are stopped for cleaning are the safety locks put in place? How is the oiling done? When and how often are the top rolls varnished? How often are the steel rolls scoured? How often is the whole machine pulled down and overhauled?

These and many other questions will naturally arise as one goes among the combers. It is illuminating to find out just how some one else handles a cotton similar to that you use. Visits of a more comprehensive understanding are thus often opened up through such discussions. A record of the settings, draft, speed, waste, and performance of the comber should be tabulated for each class of cotton worked, and should be filed so as to be immediately available when required. Is this being done by your guide?

Is there an Evener in the mill you are visiting? If so, by all means look it over, and start your question factory turning out quizzes. For the writer is coming to the conclusion, after having visited many mills, that the evening machine, so called, will soon be as extinct as the Dodo.

Does your fellow executive deem his Evener as worthy the name it bears? "Evener? You mean Unevener!" an old carding friend remarked to the writer as long as two decades ago. "For instance," he continued, "you will concede that variations will happen in a comber sliver, even if small. Now, then, if you have a doubling of 8 ends up with say a draft of 8, it is reasonable to assume that in the ordinary doubling on a drawing frame the sliver delivered in front will vary less yard for yard than any one of the slivers put up at the back will, yard for yard. This is a statement which is now accepted as axiomatic in card room practice.

"Assuming, therefore, that we have solid ground under our feet, let us take the case of the evener drawing frame. We have here—as in our prvious assumption—the same condition of so many ends up in back (8) and so much draft in order to deliver a certain size hank sliver in front. With the addition, however, of a device supposedly for the purpose of feeding the sliver in back faster or slower according as the trumpet is actuated by the gravity exerted by a sliver varying lighter or heavier from a standard weight. Now let me say that I have never yet seen an evener that was so delicately adjusted that it will operate instantly in accordance with the theory upon which the evener was designed. And then there is the difficulty of maintaining proper adjustments!"

And here the mill veteran outlined in figures his idea of how the evener actually unevened the work or had its evening property nullified. The writer has long since lost the figures, but he has also long been converted to the old carder's viewpoint. About 20 years ago, the writer saw a new evener that was said to have been designed especially to overcome the faults of the eveners then in use. But although praised to the skies the first month or two after installation, this evener soon disappeared in the nebulous mists of desuetude. The trend today is to use the drawing frame as the evener.

It is well to ask what the feeling is about the drawing frames. More and more it seems the importance of the drawing frame—particularly for fine work—is being realized.

The objects, for they are several, of the drawing process are undoubtedly, primarily that of

(1) bringing about a parallelization of the fibers.

(2) making a more even sliver.

In some cases a third result is effected—that of still further reducing the sliver. But this is not a universal practice in all mills. The writer has seen layouts that had a heavier finished drawing sliver than card sliver.

Ask your friend whether he thinks repeitive drawing pays? Has he ever made tests to determine whether he could cut out 1 or 2 processes? Some mills are resorting to this scheme in certain of their goods. From an efficiency standpoint, it is a good policy, provided the finished product made from the decreased drawing is fully as good, at least, as that made by the firm's competitors. Has an extra process of drawing ever been tried, and how did it come out as to quality and cost?

If experiments have been carried out in connection with adding or eliminating a drawing process, have their effects on the strength and general appearance of the finished product been carefully observed? Again, what was the effect on the sizings of the yarn? These are all important

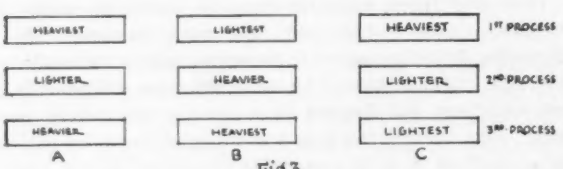


Fig3

points to consider in drawing and every mill which has not already collected authentic data—comparative data—as to the effects of over or under drawing compared with that of their usual practice should make an effort to get reliable records along this line. They will then be in the position of knowing definitely the drawing procedure best adapted for a given cotton making a given product. And no up-to-snuff executive will belittle the value of such data.

What about the draft? Is it gradually increased in each succeeding machine or has it been left as it was originally disposed of after a trial and error method of adjustment? The writer stresses this point because from his analysis of layouts in different mills, he has found a divergency of practice as to the drafting on the drawings. Theoretically, the draft increases throughout the preparation and spinning departments as the mass of fibers acted upon grows thinner. But in actual mill practice there is quite a variance in the method adopted.

In the sketch, Fig. 3, are shown three common, but different systems of drafting on the drawing frames. Of these, C is the theoretically correct one. The terms heavy, light, etc., refer to the weight of the sliver; for instance, in C, heaviest indicates that the sliver worked through by the 1st process of drawing is the heaviest, the 2nd lighter than the first, and the sliver from the 3rd process lightest of all. It may be said that some mills prefer to have their sliver weigh alike from each drawing process.

How is the sizing done on the drawings? Is every process sized, and how often? Is the 3rd process sized daily, and is a record of the sizings kept? What limits of variation are considered permissible? "Whenever my 3rd drawing sizings vary beyond a certain point, I know my finishing picker laps are not up to the mark," related an energetic card room second-hand to the writer some time ago. The picker room help in that mill was of such a nature as to be a constant source of worriment to this young man.

Production is a factor that discloses a wide variance in cardroom practice. It is customary in some places to make a fetish of 400 r.p.m. of the front rolls. Good stock, poor stock, or any kind of stock, 400 r.p.m. is what is firmly believed as the one and only roll speed. But it is not always possible to get the production from this speed that the turn of roll would seem to indicate. For the reason that not all stock will stand 400 revolutions. Better to cut down to 350 or even 300 revolutions and increase the efficiency of the machine, the quality of the product, and eventually the production.

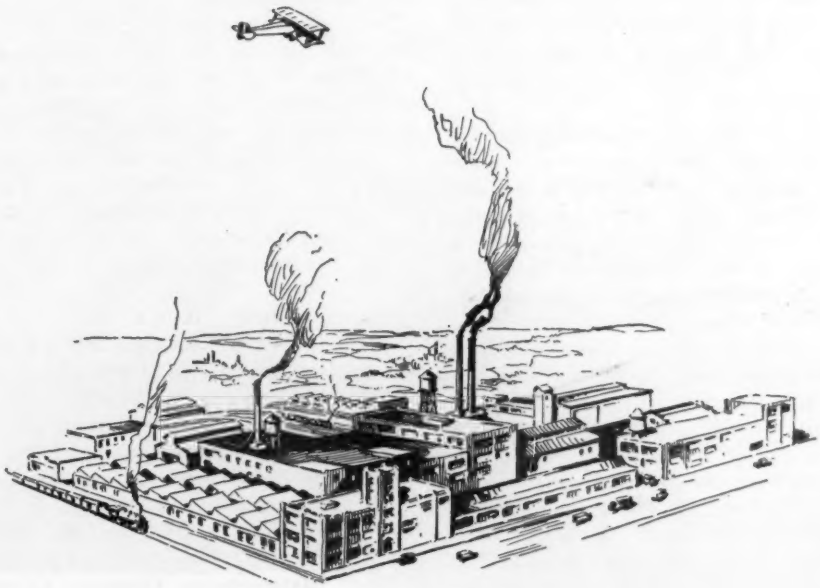
What is the per cent of stoppages your guide considers right for drawing frames? In regard to the per cent of stoppages, it may be advisable to ask what the better practice is today—4- or 6-head machines. "Give me the 4-head machine every time," ejaculated a mill superintendent when he was asked his opinion. "You cut down stoppages and increase production with the 4-head machine. The 6-head machine is inefficient compared with the 4."

Just, by the way, what is the weight of the drawing sliver in the mill you are visiting? When one has gone into many mills, one feels that one is in a position to speak confidently in regard to the average weight run on the drawings for a certain class of goods. The writer has found that 50 grains represents about the average in the mills he has visited. Mills going lighter get good work, no doubt, but it costs them more. Mills with a radial increase over this average, are always in danger of having the sliver too large to be acted upon efficiently by the top rolls.

Since a heavy sliver obviously requires more pressure on the top rolls in order to pull the fibers from roll to roll, heavier weights must be used. And there is always the risk of top roll slippage. In fact, with leather or other smooth covered rolls that act on a medium or heavy sliver it is a certainty that top roll slippage does exist. Probably your guide can give you a pointer or two on this? If he denies that slippage exists, josh him into trying the speeds of his bottom rolls and his top rolls, and then tell him to figure out the surface speeds for comparison.

There is another factor to be considered where the sliver is too heavy or the action of the top roll is not sufficient for the proper working of the cotton—and this is lumpy sliver. Sometime, when it is convenient, go to a spinning frame and remove a clearer board. Place a bit of fly waste

(*Continued on page* 1177.)



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What the Southern Mills are Doing

There was a definite trend upward in conditions during the past month in the southern textile industry. Confidence, which has been the dominant factor lately, began to be realized in concrete terms of business, which inspired more confidence and a better feeling.

One item of especial interest as regards the size and importance of the project was the announcement that the American Printing Company, of Fall River, is to transfer 100,000 spindles of equipment to a new branch that is being established at Kingsport, Tennessee. The plant in the South will be equipped with the machinery from Mills No. 6 and No. 7 of the company at Fall River, and spinning and weaving will be done. Work has begun on the construction of the Kingsport plant. The unit will include two large buildings, of brick, concrete and steel construction. The main factory will be 751 feet long, 147 feet wide and four stories high, and the second building will be 250 feet long, 80 feet wide and four stories high. The American Printing Company, owned and operated by M. C. D. Borden & Sons, Inc., at the present time operate seven cotton mills in Fall River. Their plant at Fall River comprises 88 buildings, 52 of which are brick and 24 stone, with a capacity of a million yards of cotton goods daily.

The Atwood Machine Company, Stonington, Connecticut, have loaned to the textile department of the North Carolina State College three of their latest types of preparatory machines, spinner, winder and warper. The machines are for use on silk and artificial silk, and will be of great value to the textile students in their practical work. The Stafford Company, Readville, Mass., recently donated a wide sheeting loom to the textile school. This department of the college is the textile school of North Carolina, and during the next school year an additional building will be erected and equipped with modern machinery.

It is announced that G. L. Wilcox, superintendent of the Granite Mills, Fall River, is interested in a movement to erect a $500,000 cotton mill at Wilson, North Carolina, and will have charge of the construction and operation of the plant.

Balfour Mills, Inc., being built at Balfour, N. C., by Captain Ellison A. Smyth and associates, are practically completed, and preparations are being made to install the machinery which includes 10,000 Saco-Lowell spindles and 268 Nordray looms, the latter furnished by the Hopedale Manufacturing Company.

Roaring River Yarn Mills, Roaring River, N. C., have been re-organized under the name of the Yadkin Cotton Mills. The officers are: President, R. D. Grier; secretary and treasurer, W. C. Grier; and superintendent, A. T. Church.

Dover Mills Company, Shelby, N. C., have purchased 55 additional looms from the Draper Corporation, which will be equipped with Allis-Chalmers motors when installed.

The new weave shed of the Hannah Pickett Mills, Rockingham, N. C., just completed, is being equipped with 800 Nordray looms purchased from the Hopedale Manufacturing Company.

Locke Cotton Mills, Concord, N. C., are installing twelve new looms at their plant.

An expansion program is under way at the Valley Falls Manufacturing Company, Spartanburg, S. C., which will double the capacity of the plant, giving the mill a total of 24,000 spindles and 750 looms. This mill constitutes one of the chain operated by the Martel Mills, Inc.

The new addition to the Blair Mills, Belton, S. C., will produce Turkish towels when completed, it is announced. The towels will be produced from raw cotton into the finished product, which, it is stated, will make this the first exclusive Turkish towel mill in the State of South Carolina.

Seneca Company, Seneca, S. C., has purchased the property of the Conneross Light & Power Company, which has supplied power to the Seneca mill for many years.

Work has begun on the 50 x 100-foot addition to the plant of the Nuckasee Manufacturing Company, at Greenville, S. C. The buildings will be of the latest fireproof type and modern construction, and the cost, it is understood, will approximate $22,000. J. E. Sirrine & Company, Greenville, S. C., are the architects and engineers for the project. The company manufactures underwear.

Swift Manufacturing Company, Columbus, Georgia, have under construction a new type of cleaning room for their cotton, which it is expected to have in operation within a few weeks. John Hill, of Atlanta, is the consulting engineer.

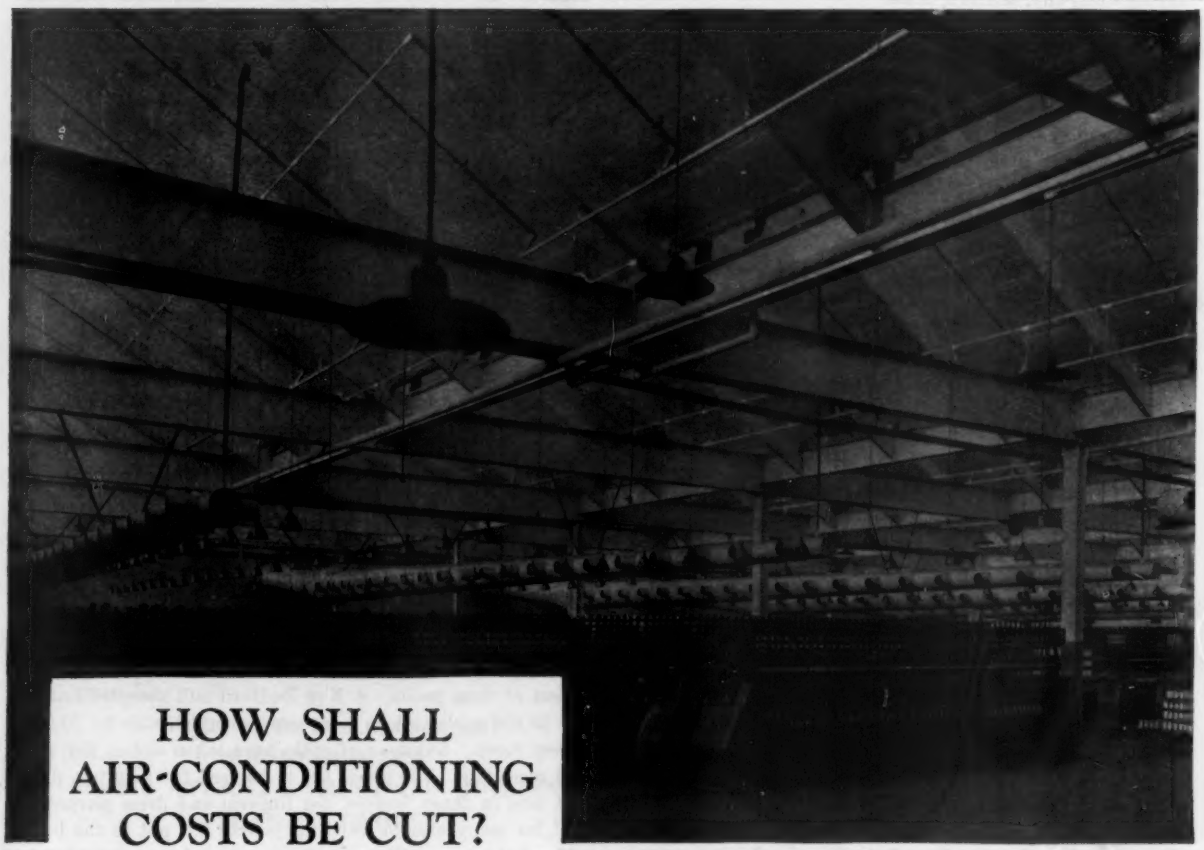
Construction work is progressing rapidly on the addition to the Athens Manufacturing Company, at Athens, Georgia. This comprises a one-story structure added to the larger mill of the company, and when this is completed, the machinery from the smaller plant will be removed to the larger buildings, and re-organization of machinery will be effected to locate the entire manufacturing facilities at the one plant. Oscar D. Grimes is vice-president and general manager of the company.

Milstead Manufacturing Company, Milstead, Ga., has awarded contract for the motorization of the plant. A new 1140-hp. water-wheel is to be installed. Robert & Company, Atlanta, Ga., are the engineers, and the electrical equipment contract has been awarded to the General Electric Company, while J. M. Clayton Company, 5 Cone Street, Atlanta, Ga., was given the contract for the installation of the electrical equipment.

Fitzgerald Cotton Mills, Fitzgerald, Ga., have purchased the Henry Cotton Mill, Hawkinsville, Ga. J. H. Mayes, of Fizgerald, is general manager of the company. The Fitzgerald company now owns three Georgia mills, as they have for some time operated the Cochran (Ga.) Cotton Mill Company. It is stated that the mill at Hawkinsville will be re-modeled, and a dyeing department added to the equipment.

It is reported that the Appleton Mills, Lowell, Mass., has an option on a 1,000-acre tract near Mt. Airy, Ga., and are contemplating the possibility of erecting there a mill of 100,000 spindles.

John P. King Manufacturing Company, Augusta, Ga., have ordered 15,000 spindles from Saco-Lowell Shops, in addition to those previously reported, and are installing 300 Nordray looms, purchased from the Hopedale Manufac-



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The Thomaston Bleachery, Thomaston, Ga., has been incorporated with a capital stock of $500,000. The incorporators are: R. E. Hightower, S. Y. Pruitt, A. T. Matthews, W. H. Hightower, R. E. Hightower, Jr., and Julian Hightower. The bleachery will be used to finish certain of the products of the Thomaston Cotton Mills and the Peerless Cotton Mills, at Thomaston, and the Aldora Mills, at Barnesville, Ga., operated by the same interests.

Social Circle Cotton Mills Company, Social Circle, Ga., are doing extensive improvement work. A complete new humidification system is to be installed throughout the mill, with the exception of the opener room; several new spinning frames are to be installed and new floors laid.

Hillside Cotton Mills, LaGrange, Ga., have purchased a 1,500-acre tract of land near LaGrange, and plans contemplating the erection of a mill are rumored.

The Planters & Merchants Mill have purchased a tract of land at San Marcos, Texas, on which it is proposed to erect a 10,000-spindle, 350-loom outing flannel mill.

The New England Mill Situation.

One month has brought about a great change in the sentiment among cotton manufacturers in New England. They are still far from being out of the most severe depression encountered in many years but it has become possible to sell goods at some price and the demand shows signs of broadening gradually right up to the winter months. For a time the course of cotton markets was in the wrong direction for them but after the August government report was issued they began to believe that a fair crop will be raised and that prices will ultimately reach a level where it will be possible to move more goods than has been possible on a 30-cent basis.

Some mill reports already issued give a hint of the severity of the trials the mills have gone through. The old Dwight corporation of Chicopee, which has a 2,000 loom mill in Alabama it has operated for 30 years, has been forced into a financial position where reorganization of the capital has become necessary to provide for the payment of improvements undertaken under the supposition that bills could be met out of earnings. The losses sustained by the Pacific mills for the first six months of the fiscal year ran over a million and a quarter dollars. Some other showings disclosed at directors' meetings have indicated losses running into substantial figures and bearable only because of large reserves.

There are several mills in Rhode Island and Massachusetts that have not turned a wheel this year. It has been cheaper to keep them closed than to buy cotton and sell goods at current rates.

The volume of orders taken has served to clean up many mill stocks for which there had been no demand for two or three months. Some cloths became actually scarce and were sought by customers all over the country when agents decided to put a price on limited holdings and to accept some business for future delivery.

This was true of Hope 4-4 bleached cottons and some other well known branded lines. It was also true of many odd goods made in Fall River for a variety of manufacturing purposes. After Hopes had been priced, sales were made to the extent of cotton on hand and mills that had been running short time were started up nearly in full. In Rhode Island, the Lonsdale Company came to an agreement with its operatives whereby they accepted a 48-hour week to be worked in five days. If additional time is worked it will be paid for on the basis of overtime.

The mills making wide sheetings, such as the Naumkeag and Pepperrel sold stock goods at low prices and have been able to make sales of production steadily enough to keep running quite full. The fine goods mills in New Bedford and other places have booked substantial orders on silk and cotton goods, voiles, poplins, and broadcloths and are now in a more comfortable position as to orders than they have been for months. The gingham mills still need business and few of them have been able to do more than prevent accumulations while running three days a week.

The volume of business taken on voiles has been large. The cloths are to be treated for flock dot voiles, the new finishing processes calling for smaller dots, and colored grounds. The Arnold Print Works, the American Printing Company, and the Glenlyon works have accepted a large business on lines of this character. There has also been a large business placed on broadcloths. The constructions have varied greatly from the single and ply yarn 40s up to the 100/2-ply goods made of Egyptian cotton. The Berkley Mills of Rhode Island took orders for 50,000 pieces of these goods. A New Bedford mill accepted orders for 30,000 pieces which were supplemented later by 20,000 pieces more. Numbers of mills have taken orders for 10,000 piece lots. The goods are to be used for printing, dyeing, and in fancy weaves, for lingerie and dress purposes, and for many uses to which they were not put in the lines offered this year. These cloths appear to have come to stay in the trade for some time.

Several large orders have been taken for shadow striped sateens and fine combed yarn plain sateens for lingerie and underwear purposes. These cloths have also become widely popular and more or less staple, supplanting many of the fine lawns and cambrics.

The most interesting business being done is that in mixtures of rayon, or artificial silk yarns, and cotton. Many new cloths are being shown, most of them for underwear and many for dress goods. They are likely to hold a large place in wash goods lines during the coming spring season. Many novelties are being shown in leno weaves and in rayon decorations of many types.

The business doing in fine ginghams has been small. The lines of solid color yarn dyed goods, decorated in many instances with self-stripes in leno or open weaves have sold well but they are hardly to be classed as ginghams although many of them are offered in box loom weaves. The Lorraine mill of Rhode Island, one of the pioneers of fine ginghams and tissues has gone into the silk and cotton goods lines freely for the new season. The tendency all through New England is toward making more colored and fancy weaves in all yarns, but notably in the numbers from 45s to 70s.

The shirting business has been particularly poor. Some fancy business in fine yarn dyed specialties for shirtings has been booked for the coming spring and fall but in no large volume. The printed shirting trade has been especially quiet. Instead of opening new lines in July many printers will not show until after September 1 and they are in no hurry to make a move on the staple numbers. They ex-

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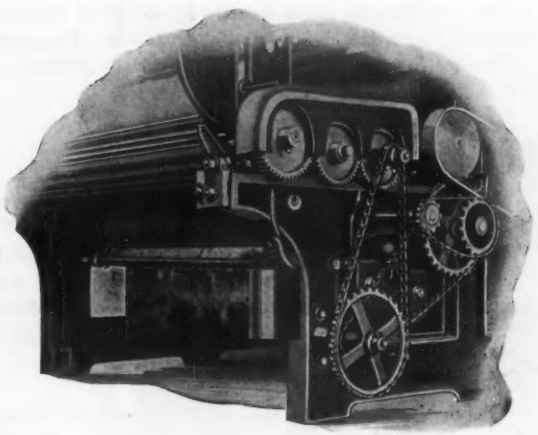

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pect to do most of their business on novelties of short runs in the machines. The shirting business on print cloth yarn foundations has been hurt by the good wearing qualities of the broadcloths and although these goods are high priced they appear to be widely popular.

In the months of July and June the finishing industries did the lightest business in years. The average capacity output was less than 40 per cent. Some of the dyed lines did better than others. The printing machines were largely idle, one large concern operating less than 20 per cent capacity. Converters began in the first part of August to send in more goods for finishing but they are still very far behind their usual preparations for the spring trade.

Manufacturers in this section look for lower cotton because of the probability that the yield will be at least 20 per cent greater than last year, while the carry-over is likely to be very comfortable in view of the great curtailment that bids fair to continue until new cotton begins to come to hand. Several mills that resumed operations after the spurt in buying in the last week in July are simply using up their cotton reserves. Some of the fine combed yarn weaving mills have bought spot cotton but have not dipped into futures. They have picked up Egyptians to fill orders on some of the finer count broadcloths.

While manufacturers admit that the abundance of money and the possibility that an early settlement of European affairs may bring on an active demand for cotton before October, will all tend to help speculators, they doubt whether the high price can be held until there is some inducement for mills to buy. With cotton over 25 cents it is certain that many mills will only buy cotton for nearby use as it has been amply demonstrated that the trade of the country is not willing to pay for cloths on the 30-cent cotton basis to the extent of producing capacity in this country. This was demonstrated by a curtailment of more than a billion and a quarter yards of cloth production this year alone, and it is shown again in the light cotton consumption in recent months. If cotton gets to a basis around 22 to 24 cents it is believed that buying will start as cloth operators need more goods and will buy some at least on that basis, where they would balk at higher figures.

There have been a few isolated instances of wage reductions in New England cotton mills, chiefly in small centers in Maine, Connecticut and Rhode Island. In two instances, the Dwight at Chicopee and the Flint Mills at Fall River, where minor reductions were made, strikes occurred and compromises had to be made. A great many manufacturers are convinced that until lower wage scales are reached there will be no sustained prosperity for the mills as it is impossible now to reach prices the market will pay without sustaining losses on the output.

Some manufacturers are outspoken concerning the necessity of reducing wages before business revives and without thought of what the effect may be politically. They contend that if politics is permitted to interfere with a normal economic readjustment at this time, any attempt to reduce soon after the national election will precipitate a bitter trade union struggle. Mr. Butler, the manager of President Coolidge's campaign, is largely interested in the Butler and other cotton mills and does not favor tampering with wages. As the usual period for acting is in June and December, any general action is not likely to be taken until after elec-

tion, despite the feelings expressed by some important interests.

The corporation printers have passed through a dull month. The Pacific mills have been closed for two weeks and the American Printing Company for three weeks while the Algonquin Company has been running about 60 per cent. Percales have sold slowly and most of the business has been done on narrow prints, draperies, or specialties.

A topic of wide interest has been the projected removal of two mills of the American Printing Company of Fall River to a new plant to be built at Kingsport, Tenn. This action was brought about directly by excessive local taxation and restrictive Massachusetts legislation. The possible difference in interior costs in the plants will probably pay for the investment in less than five years.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, August 9th, 1924.

As yet the outlook is for a much better crop of American cotton than the final outturn of last year's production, yesterday's government report indicating a yield of 12,351,000 bales vs. 10,159,000 bales last year. Linters not included.

Returns to the government, as of August 1st, averaged the condition of the plant at 67.4 vs. 68.5 on July 16th of this year and 67.2 as of July 25th last year.

While the average condition of the crop on August 1st was lower than on July 16th and about the same as on July 25th last year, the indicated crop is larger because of this year's increase in acreage, a more extensive use of fertilizer, and because of a larger allowance as to the probable yield per acre, due to weevil being less numerous and less destructive than one year ago.

The larger crop prospects, about 2,000,000 bales larger than last year, is encouraging to the trade, which is in need of a larger yield for this season, as well as to the South since there is every prospect for obtaining a good price for this year's production.

The government issued no crop forecast by states, but our deductions, based on the government's returns, point to a yield by states, compared with last year, as follows: Alabama, 906,000 vs. 599,000; Arizona, 114,000 vs. 78,000; Arkansas, 1,030,000 vs. 642,000; California, 69,000 vs. 55,000; Florida, 23,000 vs. 13,000; Georgia, 1,081,000 vs. 613,000; Louisiana, 378,000 vs 374,000; Mississippi, 1,008,000 vs. 622,000; Missouri, 224,000 vs. 124,000; North Carolina, 753,000 vs. 1,050,000; Oklahoma, 1,143,000 vs. 666,000; South Carolina, 765,000 vs. 793,000; Tennessee, 403,000 vs. 234,000; Texas, 4,346,000 vs. 4,210,000; Virginia, 31,000 vs. 52,000; all other states, 77,000 vs. 34,000; U. S., 12,351,000 vs. 10,159,000.

At the moment south Arkansas, northern Louisiana and the larger portion of Texas is suffering from a drouth of long duration, but if the needed moisture is obtained in those parts in the near future, the present outlook for the growing crop would probably be materially improved, in which case a larger yield than now indicated would likely result.

Regarding the boll weevil, Washington reports: "No great amount of damage has so far been done by boll weevils, and while they are reported numerous from practically all sections, the numbers are limited, and the damage to cotton so far has been much less than usual except in a few areas."

Returns to the government indicate that the cotton crops in Egypt, India and Mexico are progressing favorably but the weather has been unfavorable in Peru.

Secretary Hester's world's carry-over of American cotton at the close of July, while a little smaller than last year, was larger than generally expected, amounting to 2,319,000 bales vs. 2,573,000 last year, due to the commercial crop being larger than looked for—11,290,000 bales vs. 11,283,000 in season before last, and because the world's consumption of American cotton being less than generally expected—11,241,000 against 12,631,000 for the previous season.

DISTRIBUTION OF WORLD'S CARRY-OVER OF AMERICAN.

July 31st	This Year	Last Year
Southern mill stocks	306,000	531,000
Northern mill stocks	355,000	499,000
European mill stocks	565,000	520,000
Stocks at counted interior towns	177,000	232,000
Stocks at uncounted towns and plantations	167,000	184,000
Stocks at U. S. ports	223,000	184,000
European port stocks	526,000	423,000
Total carry-over, July 31st	2,319,000	2,573,000
Lint cotton carried over	2,089,000	2,396,000
Linters carried over	230,000	177,000
	2,319,000	2,573,000

Exports from the United States last season were 5,658,000 bales vs. 4,643,000 in previous season.

The Greensboro Loom Reed Company has been organized with headquarters in the Bumpass Building, Greensboro, N. C. The company will manufacture all kinds of loom reeds for the weaving of silk, cotton and wool, it is stated. Leno reeds, lease reeds, warper reeds, soldered reeds of every description, as well as slasher combs and other reed and comb specialties will be produced, it is announced. A reed repairing department also will be maintained.

Some of the machinery has been imported from England. Practically all machinery has been installed and the plant and machinery are modern in every detail. It is further stated that some of the more skilled reed craftsmen in the country have been employed to operate this equipment.

George A. McFetters, owner and manager of the concern, is one of the better known reed men in the country, having had a long and varied experience. He has held numerous executive positions with some of the larger reed manufacturers in both the North and the South.

There is an extremely large demand for knitted outerwear at the present time in Australia. During the past two years, and at the present time, the demand for knitted costumes is greatly in excess of the supply. The heaviest demand is for sweaters, costumes, bathing suits, and mufflers. The extremely heavy demand for knitted goods has led to an enormous increase in the number of factories started.

GLENN-LOWRY Y. M. C. A.

WHITMIRE, S. C.

Brunswick-Balke-Collender Co., July 25, 1924.
35 South Forsyth St.,
Atlanta, Ga.

Dear Sirs:

We have your request regarding our bowling equipment and billiard tables that have been in service for five years.

Will state that these features in our building are one of the great benefits that we have in co-operating with our employees. We all get together around the tables and in the bowling room and learn to know each other better.

The equipment that we have has given us entire satisfaction and after about five years use is in A number one condition. We feel free in saying that we could recommend your equipment to any one who desires the very best of equipment and service.

Yours truly,
Mgr. Y. M. C. A.

Community Building, Glenn-Lowry Manufacturing Company, Whitmire, S. C.

A corner of the billiard room in this building.

The bowling equipment.

Fostering labor co-operation

A RECREATION centre in industrial plants brings greater co-operation between employers and employees. There is an enhanced employee good-will, a higher efficiency, better co-operation, and a noticeable reduction in labor turnover.

As evidenced by the letter and views illustrated above, the Glenn-Lowry Manufacturing Company, of Whitmire, South Carolina, has found its billiard and bowling equipment most beneficial in establishing contact with its employees and advancing the spirit of co-operation.

As makers of the world's finest billiard and bowling equipment, the Brunswick-Balke-Collender Company has furnished the equipment used in the country's most successful industrial welfare associations. The knowledge and experience thus gained is at the disposal of any one interested in this means of effecting a closer relationship between employer and employee.

The BRUNSWICK-BALKE-COLLENDER *Company*

Branch houses in the principal cities in the United States and Canada

623-633 South Wabash Avenue, CHICAGO

NOTES ABOUT MEN YOU KNOW OR KNOW ABOUT

F. C. GAMBLE has resigned at the Florence Mfg. Co., Forest City, N. C., where he was overseer of the cloth room, to take charge of the cloth room at the Wade Manufacturing Company, Wadesboro, N. C.

R. G. WOOD has accepted the position of superintendent at the Wampum Mills, Lincolnton, N. C.

G. VAN TROMP GOVIER has accepted a position with the A. E. Staley Mfg. Company, Decatur, Illinois, as chemist, and will carry out work mostly in connection with sizing problems of cotton mills. He was previously connected with Charles R. Allen, of Charleston, S. C., and before that was chemist for four cotton mills in Manchester, England, for several years.

W. M. MCKINNEY has resigned as overseer of carding and spinning at the Peerless Cotton Mills, Thomaston, Ga.

W. G. THOMASON has been promoted from second hand to overseer of spinning at the Peerless Cotton Mills, Thomaston, Ga.

CHARLES E. RICKARD has succeeded Z. E. Thompson as cloth room overseer at the Exposition Cotton Mills, Atlanta, Ga. Mr. Rickard was formerly at the Oakland Cotton Mills, Newberry, S. C., in a similar position.

JOSEPH L. GADBOIS recently resigned his position with the House of Byer, Cambridge, Mass., to accept a position with the Seneca Knitting Mills, Inc., Seneca Falls, N. Y.

S. B. LAWRENCE has resigned his position as overseer of weaving at the Gluck Mills, Anderson, S. C., and was succeeded by A. Y. Hughes, who, until recently, was overseer of weaving at the Calhoun Mills, Calhoun Falls, S. C.

W. F. INGRAM, who formerly was vice-president and treasurer of the Kincaid Mfg. Company, Griffin, Ga., has been elected vice-president of the Cannon Manufacturing Company, Kannapolis, N. C., and has entered upon his new duties.

J. T. PHILLIPS, formerly superintendent of the Manville-Jenckes Company's Loray plant at Gastonia, N. C., is now general superintendent at the Kinston Cotton Mills, Kinston, N. C.

B. M. BRADFORD, who has been overseer of carding at the Waxahachie Cotton Mills, Waxahachie, Texas, has accepted a position at the Lullwater Mfg. Company, East Point, Ga., as overseer of carding and spinning.

JOHN C. TOLER has become superintendent of the Toler, Hart and Holt Mills, Fayetteville, N. C., succeeding H. C. Duffer, resigned.

S. N. WILLARD has become overseer of weaving at the Lullwater Mfg. Company, East Point, Ga.

F. M. FOSTER recently resigned as overseer of carding at the No. 1 Mill, Thomaston Cotton Mills, Thomaston, Ga., and was succeeded by Walter Massey, who, having had charge of the carding at the No. 2 Mill, now is overseer of both plants.

RALPH CARTER has become superintendent of the Portage Underwear Mfg. Co., Inc., Portage, Wis. He is a grandson of William Carter, founder of William Carter & Sons Underwear Mfg. Co., Needham Heights, Mass.

CHARLES H. FISH has resigned as general manager of the Imperial Cotton Mills Co., Los Angeles, California, it is reported.

ERNEST LOVERING has resigned as treasurer of the Dwight Mfg. Company, Chicopee, Mass., and Alabama City, Ala., and is succeeded by George Nichols, of Minot, Hooper & Company.

N. H. ECKMAN is in charge of the office of the Baldwin Chain & Mfg. Co., of Worcester, Mass., recently opened at 404 McGlawn-Bowen Bldg., Atlanta, Ga.

GENERAL LAWRENCE D. TYSON, former president of the American Cotton Manufacturers Association, has been nominated for United States Senator by the Democrats in Tennessee, which practically assures election in that state.

P. E. GLENN, former president of the Cotton Manufacturers Association of Georgia and treasurer of the Exposition Cotton Mills at Atlanta, has been appointed southern representative on the National Child Labor Committee of the National Association of Manufacturers.

J. R. BRANNON has been engaged as overseer of spinning at the Morven Mills at Durham, N. C., in place of J. C. Orr, resigned.

W. T. NORTON has been engaged as overseer of carding and spinning at Captain Smyth's new Belfour Mills, Balfour, N. C.

THOMAS HARRIS, of Providence, R. I., who has for sometime been connected with the Jenckes Spinning Co. at Pawtucket, R. I., has been appointed superintendent at the Globe Mill of the Manville-Jenckes Co., at Woonsocket R. I., succeeding the late W. A. Robinson.

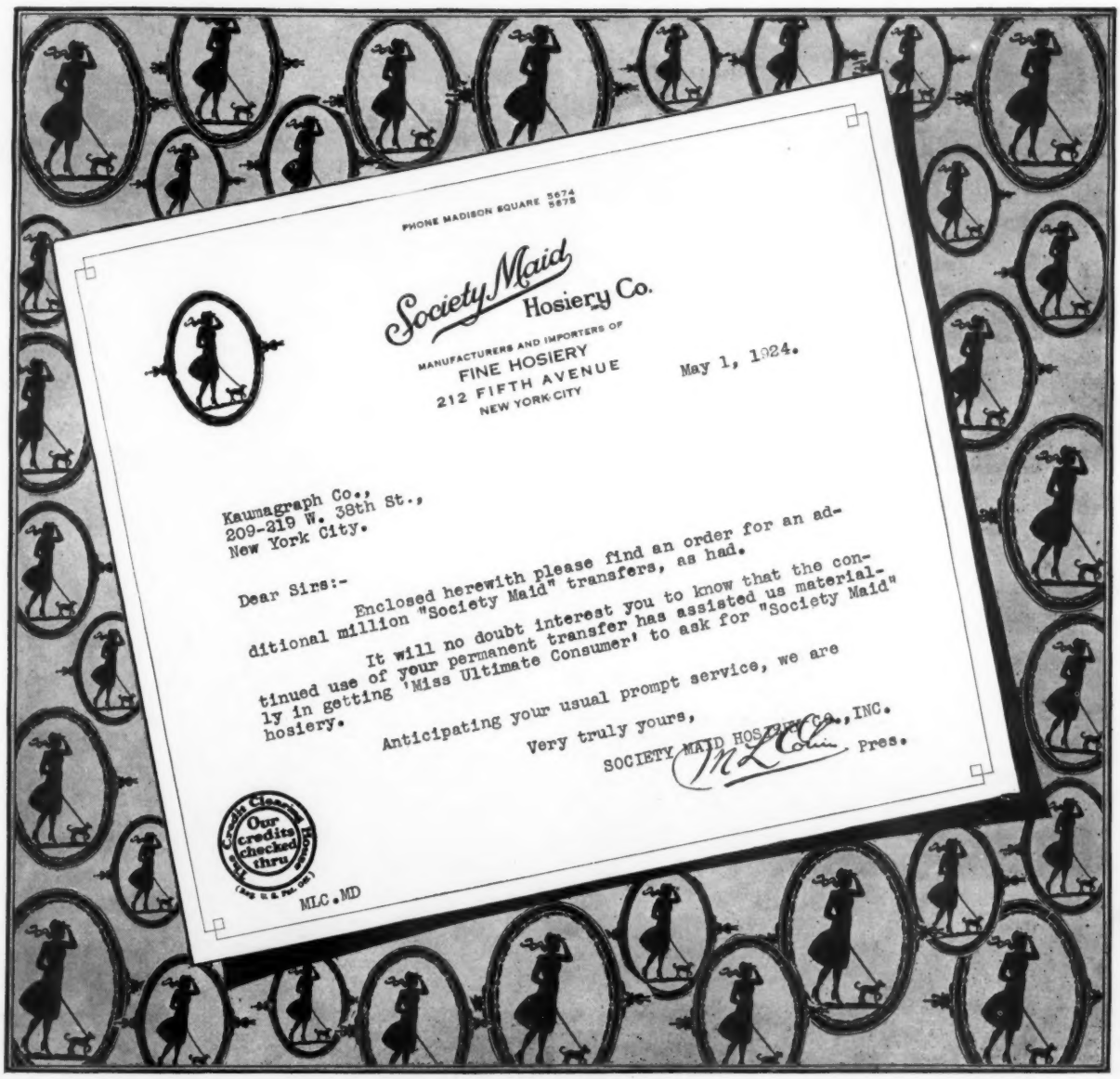
SQUIRE BAILEY, vice-president and superintendent, The Bailey Knitting Mills, Fort Plain, N. Y., is spending his summer vacation in the Adirondacks.

FRANK LEES, chemist for Bosson & Lane, Atlantic, Mass., is traveling in England. He is expected to return to America the latter part of September.

JOHN H. HOUGH, sales manager for the Mathews Conveyor Company of Ellwood City, Pa., was a recent visitor at Atlanta and other points in southern territory where he was conferring with the sales representatives of his company concerning new business prospects and installations.

Parks-Cramer Company announce they have placed on the market a folding pocket sling psychrometer, designed for the mill superintendent who would know more of the atmosphere in his mill and the conditions under which his goods are manufactured. This pocket instrument is produced as a convenient, durable, yet sensitive instrument for correctly determining the humidity.

Won't wear off, wash off, tear off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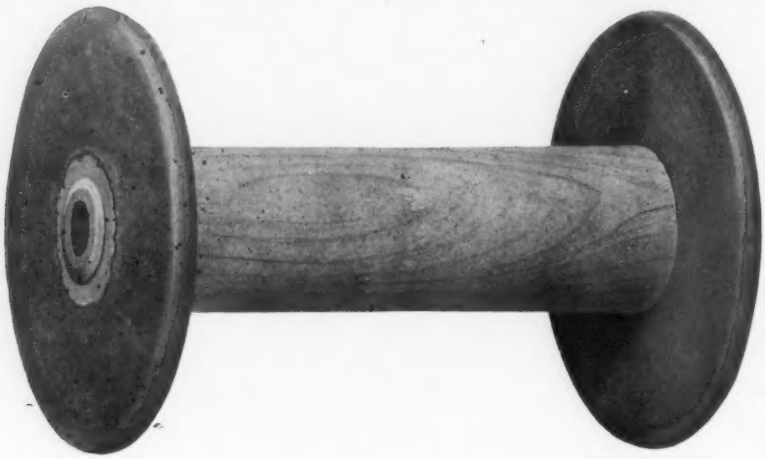
Facts About Fibre Head Spools



THE U S Bobbin & Shuttle Co. originated the round bevelled head bushing and method of application, without which the fibre head spool would be a failure. Fibre is expensive, is heavy, and fibre head spools are not always by any means the wisest choice. Many times a light weight softwood spool or the Boynton Shield protected spool is advisable, depending upon the work to be done.

We do NOT guarantee that fibre will not crack, warp or chip, or that you cannot break the fibre head spool, because we know better, and because we do not believe in advertising rash statements that have not been proven.

We do say, however, that there are certain advantages, such as toughness for a thin head, allowing a greater traverse for the same length overall as a wood spool and freedom for some time from rough edges which will develop on plain wooden spools.

Our method of applying the fibre head to the wooden barrel is unexcelled and we take extra precautions in manufacturing these spools to maintain the same high standard of U S Quality that marks our other products.

There are two types of fibre head spools on the market; the soft or laminated fibre and the hard vulcanized fibre. We recommend the latter.

If you are interested, be sure to write us for samples and prices.

U S BOBBIN & SHUTTLE Co.

Eight Factories

LARGEST BOBBIN and SHUTTLE MANUFACTURERS in the WORLD

Providence R.I.

AN OLD TIMER SAYS

Hello, fellers! I am back on the job again.

What kind of a vacation did you have, Old Timer?

Oh, I had a great time, of course—broke several records.

Broke several records! What do you mean?

Well, for one thing, I can show more mosquito bites to the square inch than any man living; had seven punctures on one wheel the first day out; went through two big rains and finally got stuck in a mudhole on one of those fine country roads we are paying three cents per gallon to keep up; had to stay all night at a farmer's house where the darn hogs grunted all night and the blamed ducks began to quack at 4 a. m.

Yes, I had a fine night's rest, and a lovely disposition to start out with the next day. But altogether I enjoyed my vacation very much—mostly because it was a change, I suppose.

You know, I have never been able to figure out this vacation business anyway. Just why a man will start out on what he calls a vacation and go through more hardships, do more real work, subject himself to more inconvenience in a week than he has at home in a month, and then come back and say he has had a wonderful time—well, it's beyond me.

Home and its comforts sure do look good though, don't they, after you've been off for a week or two.

Hello, Jim, you old geaser, how are you, anyway?

Just fine, Old Timer. You sure do look like you had worked out somebody's whole farm, the way you are sunburned.

Then I proundly showed Jim my several patches of mosquito bites, told him about how nicely (?) the flivver acted, how many watermelons I had eaten, etc.

But presently Jim interrupted me with a jab about my last talk to him by asking:

Well, there is just one thing I want to know, Old Timer.

What's that, Jim?

Did you get all that perseverance stuff out of your system?

Well, Jim, I wasn't supposed to be troubling my mind about my work—I was supposed to be on a vacation.

Work! Jim echoed. How does perseverance have anything to do with your work?

Well, for the love of Mike, Jim, can't you get anything into that skull of yours, at all? I talked to you for a solid hour trying to get you to see how perseverance did apply to your work, and now you talk just like you didn't understand one word of my reasoning. You'd better get your July COTTON and read that article again.

I don't have to, Old Timer, I've got it right here in my pocket. And to my surprise, Jim had cut out the article and was carrying it around with him.

I've read that article until I almost know it by heart, Jim said, and by George! that young Super told me the other day that he certainly was pleased with my work and that he never would have believed a man who had been in the mill all his life, like I have, could have ever acquired the education that I have.

Bully for you, Jim! That sure was some compliment. But be sure you handle Mr. Perseverance in the right way, Jim, and don't get any of that obstinacy that I told you about mixed up with it.

Sure, Old Timer, I've decided that what you meant by that word obstinacy was just simply hard-headedness.

Yes, Jim, that's a very good explanation. However, you never were very hard-headed, and I'm not much afraid of you hurting yourself in that way, but I do want you to fully understand what perseverance is and how it will make you a bigger man. You know I told you—

Wait a minute, Old Timer! I'm quite sure I understand you about perseverance, and I have already derived much benefit from your talk. In fact, I now look upon my job with more real pleasure than I ever have before. I think you have taught me a lesson in perseverance that will stay with me through life. So now after saying all that, I hope you are satisfied and will be willing to take up some of the other subjects you mentioned the night you ran wild on perseverance.

All right, Jim, just as you say, but I want to leave off by saying I do not believe I ever saw a man who had too much. I'll admit, and have told you several times, that you can run a room as well as any overseer I have ever known, but that alone is not going to put you into the big job that it is my ambition to see my life-long friend get. Therefore, I want you to fully understand that these things I am telling you *will* put you there if you will be as good a pupil in trying to learn them as you have been in studying mill calculations.

There is a well established law that governs the price of almost everything—it matters not whether it is eggs, apples or your services. Your services is what you have to sell, and even if you are a good overseer, just remember that there are several more men who are good overseers. The simple reason why some positions pay $10,000 to $15,000 per year is because the demand for such men is *great* and the supply is *small.*

The only way I know of to get one of those positions is to climb a rung or two above the crowd and get into the class where there are *few* instead of *many.*

You remember, Jim, I mentioned the word character,

(*Continued on page* 1159.)

Sell and Grow

Progressive Business is a train of departments pulled by a twentieth century selling engine. Production, generally, is limited only by the capacity to sell. *To sell is to grow*—in size, in profits, in power to serve.

Growth is the evidence of the healthy turnover of working assets. It is accompanied by decrease in unit costs—selling and production. Larger profits can be taken, or selling prices reduced, to increase sales.

As fundamental to Growth, modern management applies scientific Market Analysis and sound methods of Cost Accounting. One gives the sales department absolute knowledge in place of impressions; points the way to efficient selling plans and successful selling action. The other furnishes the management facts and figures from every department—the timely, dependable guides to safe and steady progress.

It has been the pleasure of the Ernst & Ernst organization to cooperate with firms, nationwide, in establishing the simplest and most economical methods of Market Analysis—eliminating waste fields in selling; and sound methods of Cost Accounting—furnishing the power to control inventories.

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HOW OTHER MEN MANAGE

Practical Discussions by Cotton's Readers On all varieties of Mill Subjects

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsibl for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Splicing Yarns for Cord Fabric.

EDITOR COTTON:

Will you kindly place in your "How Other Men Manage" section the following query, which I should like to see discussed by the readers of this department. In the making of 13/3/3 yarn it is always desirable to have the knots spliced in order to avoid a very large and unsightly knot if all the strands are tied in one place. I would like to have some of the readers of this department advise as to the latest or best method of inserting these spliced knots.

D. N. (N. C.)

Slashing and Dressing.

EDITOR COTTON:

I am engaged, and much interested, in the sizing and dressing of twines, some of which are made from spun yarn and others from various numbers of hard roving, in the grey and variegated colors. I found some years ago, after having tried boiling size and using many formulas, that the best and most desirable results are obtained from size with the proper amounts of starch, gums, softeners, etc., cooked in the regular way and used cold at all times. Some of these batches are not used for two weeks, and yet they are as fresh as when newly made, and there is no sour or acid smell. Besides, we get a better white on the grey twines with cold size, and, as nearly everyone knows, when yarns are boiled out either for dyeing or in the slasher, the motes and other impurities generally come to the surface.

Referring to the June number of COTTON, I have read what Dr. Cathcart, Mr. Seydel and the others have to say regarding the slashing or sizing of warps, but notice there was nothing said about the machines or methods used in preparing warps when the textile industry first started in this country, many years before the slasher was dreamed of. It was stated that we followed the British dressing process, which at that time was the cold dressing machine. Some of these are in use in the fine mills in Scotland and the Continent today. Less than forty years back I saw the dressing machine in operation in four mills in New England, but these were replaced with slashers long ago. As I understand the difference between the cold dressed warps and those that were slashed, the former wove fully as good and had a better look and feel, and also brought a better price on the same construction.

These remarks may seem radical to some of the readers of COTTON, but they, nevertheless, are true.

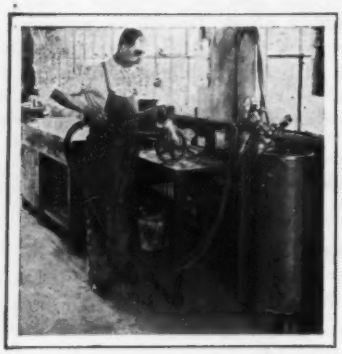
I also believe that the speed limit on slashing has been reached and is overdone in some mills. Some time ago a contributor was telling of his experience with an uneven boil in the size box; on one side it hardly boiled while on the other side, where the steam entered, the boil was all right. At the front of the machine the yarn on the cold side came over stringy. My explanation of this is that it had more size on the surface, and the speed was too high for it to dry. To get results on regular slashing the boil must be kept even all across the box, whether it be at 212 degrees or something else.

I will now leave the slasher and ask what do our chemists and mill men who are interested in warp preparation think about the idea of trying slashing with the cold preparation, after the proper formulas have been worked out to make size which, after becoming cold, will flow or gravitate to the size boxes. Of course, making size strong enough to give weaving results on heavy plain picks and yet be thin enough to run down from the tank might give some worry, but these obstacles can be overcome. If we get the size formula correct for the heaviest picked goods we can easily arrange for the lesser counts.

Someone may suggest that by using cold size we will not get as good penetration. That will depend upon the time the yarn is in the size boxes. Past experience has taught me that penetration depends on the length of time the yarn is in the size and I would suggest that two size boxes be used in tandem, behind a hot air slasher. Some years ago I had occasion to try two boxes in tandem on a Cohoes slasher with regular hot size, boiling, on heavily picked work. The reason I mentioned the hot air machine is, first, on the old dressing machine, the yarn came from beams at either end through reeds and size rolls, one bottom and one heavy top, through another reed, being brushed; some machines having round or cylindrical brushes, others flat brushes, the latter being the better. The loom beam was elevated over the center of the machine having a hook lease reed guiding the yarn onto the beam. Drying was done in a large iron casting with steam passing in and out underneath the machine at either end—or as we call it, hot air drying. The second reason is that, as most of us know, when yarn that has been starched or sized first strikes the hot cylinder it has a tendency to stick or cake, but the same sheet going into a hot air machine, one with return rolls on the outside of the chamber, will dry more gradually and eliminate the chances of tendering, and produce better weaving results.

By this method we might not get as large production, but most assuredly would be compensated in quality and

Service in Product



A one-man oxy-acetylene repair shop in an Eastern textile mill where worn and damaged parts are welded.

Salvage— not new parts

THE COST of a one-man repair shop is small. Although it shows a dollars-and-cents saving in repairing parts instead of buying new parts, its greatest saving is in time. One such repair department welded the "dead frog" from a cotton loom in 5 minutes; the lay sword of a loom in 8 minutes; a cam bracket in 4 minutes. Such speed in repairs means the stopping of production on a loom for a few minutes instead of hours or days. Any Oxweld engineer will explain how Oxweld Service can accomplish such results for you.

OXWELD'S SERVICE through resident engineers, fieldmen, laboratories, advice on welding and cutting, etc., would be of little use to you were it not for Oxweld's basic service—the service in Oxweld products.

Every Oxweld product is as nearly perfect as we know how to make it, and yet improvements and refinements are being made constantly. Since the basic injector or low pressure design of Oxweld products is correct, few of these changes are noticed by you. But all of them are the result of wide experience in the field and careful study in the laboratory.

Every factory man realizes that all machinery must be adjusted from time to time and occasionally repaired. If you own Oxweld apparatus, this need not bother you. Oxweld fieldmen supervise minor adjustments and repairs, while near you is an Oxweld factory-supervised repair station for major repairs.

If you are not an Oxweld user, write for free book, "Oxweld Can Do It," or ask the nearest resident engineer to see you. Remember that Oxweld apparatus, including Oxweld Service, requires only a moderate investment.

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Oxweld

WELDING AND CUTTING APPARATUS

WORLD'S LARGEST MANUFACTURERS OF WELDING AND CUTTING EQUIPMENT

production in weaving. Even if it took three machines to do the work of two ordinary cylinder slashers, the cost of operation should not be any higher—unless the mill be situated in a "closed-shop" state where the traveling delegate lays out the work for the management. After the size is cooked once, no more steam is required at the size boxes, and I believe that less steam will do better work in a hot chamber than is consumed in cylinders.

As to penetration, if some of the old-timers could think back, say fifty years, they would remember having seen some slashers with only one set of size rolls. The reason for double sets was this thing we now call penetration, because the yarn got, practically speaking, a double dip. What the invention of the slasher has done in regard to cost means that on a certain line of goods one slasher will turn off ten warps to one on the old dresser. I can't help but remark that the slashing machine, as it is slangily called, has had some rough handling these many years. Scotland did her part on improving it when she got the idea of taping and drying on one cylinder, especially on fine work, but on pattern colored work in this country, since the introduction of long chain beaming (1880), we have even beat the records of the Scotch tape dressing by knowing how best to place our beams and beam our colors, also by putting the yarn in the raddle at the front so the pattern will stay in its proper place without changing its position. Poor yarn is a costly item in any mill, and good spun yarn butchered on its way to the weave room is still more so.

In conclusion I will say that we have a lot of experimenting to do regarding the dressing of warps to find out what is best; also, I don't believe we have got out of the slasher all that it is capable of producing. If we will just coach it and use it more as a warp dressing machine for quality, I have no doubt but that the ultimate results will prove interesting and worth while to any manufacturer willing to go to the trouble of trying out the foregoing suggestion.

Someone might say, "Why doesn't 'Mack' try these dreams out on the slasher?" The answer is that we have no slasher at our plant, but I have faith enough to give my time or my company's time to any firm who may desire to experiment along these lines. Mack (Ga.)

Right and Left-Hand Twill on Denim.

EDITOR COTTON:

In June COTTON "Contributor No. 99" says that in weaving denims with a left-hand twill he notices that the twill is much more pronounced on the surface of the cloth and also that the surface of the cloth is much smoother, and the stray fibers in the yarn are shown to a lesser degree than is produced by the use of a right-hand twill. He wanted to know the principle of weaving governing this case.

I find this question plainly answered in Nisbet's "Grammar of Textile Design," which is an excellent book, and I am quoting what the author has to say on this subject:

"If the same twill weave is produced to the left in one fabric, and to the right in another fabric of exactly similar texture, and woven from similar yarn, or if the same twill is produced in both directions in different parts of the same fabric, it will appear to be more pronounced in one direction than in the other, according to the direction of the twill in relation to the direction of the twist in the yarn composing it. This difference is also observable between the obverse and reverse sides of the same fabric, especially if warp and weft are in equal or nearly equal quantities on both sides. For example, if a twill inclines to the left when viewed observely, it will incline to the right when viewed on the reverse side, albeit the direction of twist in both warp and weft remains the same. Therefore, the direction of twill in relation to the direction of yarn twist is different on each side of the fabric, with the result that the twill appears to be more prominent on one side than on the other. In this case, however, the influence exerted by the deflection of the warp line out of a straight course between the breast beam and back rest of a loom (to spread the warp threads and thereby obtain what is termed 'cover' in cloth) will be a contributory factor affecting the relative prominence of twill on both sides of a fabric. This circumstance, however, does not entirely account for the difference between the obverse and reverse sides of a twill cloth, otherwise no difference would be manifest between the same twill produced to the right and to the left in different parts of the same fabric.

"What actually occurs is that the series of ridges and furrows in a twill fabric are *more sharply defined* and pronounced if they incline in the opposite direction to the twist in yarn with which the ridges of twill are formed, and *per contra*, the twill will be *less prominent* if the twill and yarn twist lie in the same direction.

"This peculiar and interesting phenomenom in twill and allied weaves has engaged the attention of several textile experts who have sought to discover the cause; and although various theories have been suggested as probable explanations of its true cause, there is still a matter of conjecture and it cannot, therefore, be positively stated.

"According to one theory this phenomenom is attributed to the effect produced by the reflection of light at different angles from the fibers composing the threads, according to the direction in which the fibers lie in relation to the direction of twill. This may partly account for the different effects, but it is apparently not the chief factor, as may be easily demonstrated by taking a piece of cloth in which the same twill is produced in both directions, in different parts, and viewing it in a neutral or well-diffused light, when a decided difference will be observed between the twill inclined to the right and that inclined to the left. The twill in the opposite direction to the twist of yarn will be more distinct than that in the same direction as yarn twist. It would appear, therefore, that the difference is caused either partly or entirely by some influence exerted by the direction of twill upon the twist of yarn. This preconception forms the essence of another theory based on the assumption that since the spirality of a spun thread is artificial, and not a natural feature of such a thread, the fibers composing it subsequently tend, under favorable conditions, to recover their original straight and free condition, thereby causing the thread to untwist, especially when it is subjected to tensile strain. Hence it is suggested that, during weaving when the respective threads are under tension, they tend to untwist in the cloth and consequently roll slightly out of their original perfectly straight course, and assume a more or less inclination between the points where they intersect with other threads, unless some means are adopted to prevent or check such tendency by producing the twill

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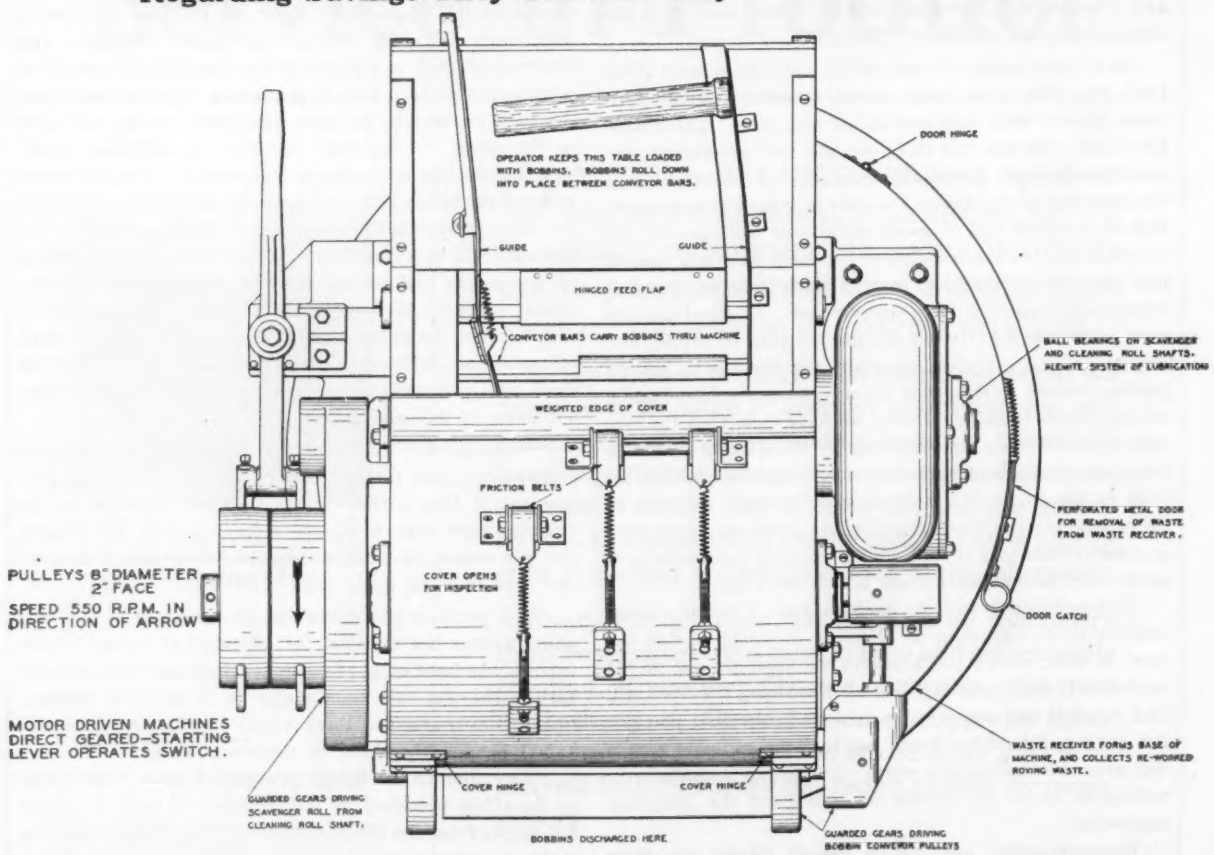
Any Mill Using Roving Bobbins Can Obtain Accurate Figures Regarding Savings They Can Effect by a Termaco Installation


OPERATOR KEEPS THIS TABLE LOADED WITH BOBBINS. BOBBINS ROLL DOWN INTO PLACE BETWEEN CONVEYOR BARS.
DOOR HINGE
GUIDE
GUIDE
HINGED FEED FLAP
CONVEYOR BARS CARRY BOBBINS THRU MACHINE
BALL BEARINGS ON SCAVENGER AND CLEANING ROLL SHAFTS. ALEMITE SYSTEM OF LUBRICATION
WEIGHTED EDGE OF COVER
FRICTION BELTS
PERFORATED METAL DOOR FOR REMOVAL OF WASTE FROM WASTE RECEIVER.
PULLEYS 8" DIAMETER 2" FACE
SPEED 550 R.P.M. IN DIRECTION OF ARROW
COVER OPENS FOR INSPECTION
DOOR CATCH
MOTOR DRIVEN MACHINES DIRECT GEARED—STARTING LEVER OPERATES SWITCH.
WASTE RECEIVER FORMS BASE OF MACHINE, AND COLLECTS RE-WORKED ROVING WASTE.
GUARDED GEARS DRIVING SCAVENGER ROLL FROM CLEANING ROLL SHAFT.
COVER HINGE
COVER HINGE
BOBBINS DISCHARGED HERE
GUARDED GEARS DRIVING BOBBIN CONVEYOR PULLEYS

Mills, cleaning roving bobbins with a Termaco bobbin cleaning machine, lower the amount of roving waste, annually save an exceedingly substantial sum by not cutting the staple and cut down to an astonishingly low figure the yearly cost of bobbins. The Termaco, even when operated at considerably less than full capacity, yet has repaid its cost three times in one year by the savings it has effected.

Investigate the Termaco if you would cut down roving waste to the very minimum and save at least that 20% of all roving waste which is now being thrown out by your carding machines because of the fibres cut short by hand cleaning.

Investigate the Termaco if you would save every year the cost of those thousands of bobbins which are quickly splintered and made useless through cleaning by hand.

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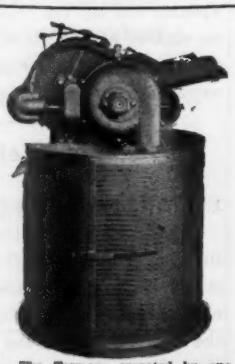
General Supply Co., Danielson, Conn., Rep. for N. Y. & N. E. (Northern representative handles complete stock of parts)
E. S. Player, Greenville, S. C., Agent for South Carolina.



The Termaco operated by one employee cleans about 30,000 roving bobbins per working day. Bobbins are placed on feed table from where they are fed between bars connected at each end to flexible conveyor belt which slowly carries bobbins around the cleaning roll. Cleaning roll covered with card clothing, rapidly revolves tangent to bobbins, causing them to rapidly revolve as they are carried around cleaning roll. Carding motion, thus produced on bobbin's entire circumference, gradually cards off all yarn in small pieces, instead of being cut at one point, and without injury to fibre. Bobbins drop from a discharge chute and the waste roving is stripped by scavenger roll from cleaning roll in such condition it requires no reworking. The Termaco is simple and economical to operate and keep in perfect operating condition.

in the *reverse* direction to that of the yarn twist.

"But whatever may be the dominant factor determining the relative prominence of twills, it may be repeated that if they are produced in the reverse direction to that of the twist in the yarn, they will be more pronounced than if both the angle of twist and that of the twill are inclined in the same direction. And so long as this dictum is observed, it is immaterial whatever direction a twill may incline, or in what direction the yarn is twisted during spinning. Therefore, if a bold warp twill is produced from yarn spun 'twist way,' the twill should incline upward from right to left. Likewise, if a weft twill is produced from yarn spun 'weft way,' the twill should also incline upward from right to left. (This may at first appear inconsistent, until it is observed that the direction or spirality of twist in a spun thread inclines in reverse directions when placed at right angles to itself.) Again, if a twill weave having warp and weft displayed in equal or nearly equal quantities on both sides of the cloth is produced from warp spun 'twist-way,' and weft spun 'weft-way,' the twill should in this case also incline upward from right to left. If, however, a weft twill is produced from yarn spun 'twist-way,' or a warp twill from yarn spun 'weft-way,' the twill should incline upward from left to right." H. (N. C.)

A New Patent Dust Trunk.

EDITOR COTTON:

I read COTTON with great interest, and have found various articles therein very useful to me. I was especially interested in the article, "Texas Textile Men Meet at Waxahachie," appearing in your June issue. At this meeting one of the speakers gave his experience in connection with the "Murray" cleaner, and also the English cleaning trunk. This latter trunk has always been a good and popular method of cleaning cotton in a large majority of English, Continental and Indian mills, and also mills in the Far East, and, in my opinion, fully justifies its popularity.

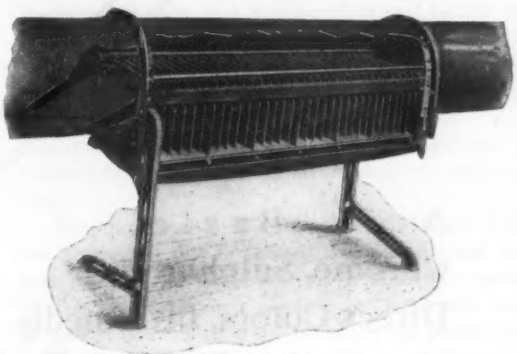
I submit herewith some extracts taken from the July issue of the *Textile Manufacturer*, which gives an illustration and a description of a new patent of a gridded trunk recently put on the market. The article says:

"It almost goes without saying that in all cotton spinning mills the predominating idea in the blowing-room should be to clear the cotton of all dust and undesirable impurities without damage to the staple. It is for this reason that in modern cotton blowing-rooms, wherever the cotton is conveyed by piping, or exhausted, from one opener to another, the practice is to incorporate dust trunks, as it is found that the simple dragging of the cotton over the grids inside the dust trunk is sufficient to extract much dust, etc. Hitherto the grids have been constructed with fixed bars, but spinners will be interested to learn of a new dust trunk with patent vibratory grids.

"A view of one section of the new 'vibro-pneumatic' dust trunk is shown in the illustration, with a portion of the outer casing broken away to illustrate the manner of mounting the vibrating grid plates. These are fulcrumed near the top, and hang loosely on slotted racks that extend lengthwise of the dust trunk. The upper edges of the racks are provided with slots or teeth which provide a ready means of altering the setting of the grid plates, enabling them to be placed nearer together or spaced wider, according to the class of cotton being worked. Generally, it is advisable to set the grids at the feed end of the trunk closer together than those at the delivery end, in order to secure the maximum cleaning power. With this new method of mounting the grids on racks, the carder can adjust the grids to his liking until he obtains the best possible results.

"Owing to the grid plates being loosely suspended in the manner shown in the illustration, they are caused to vibrate partly by the exhaust-air current and partly by the tufts of cotton striking against the upper edges of the grids. This vibration, the makers claim, greatly increases the cleaning capacity of the trunk, as the impurities extracted are always settling to the bottom of the trunk.

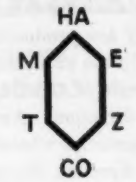
"A special feature of the new vibro-pneumatic dust trunk is the ease with which it may be cleaned when necessary. In dust trunks constructed with fixed grids the dirt is liable to become choked between the grids, which makes cleaning a long and tedious process. All that is necessary



in the new trunk is to open the door at the bottom of the casing and draw the hand quickly from one end to the other of the grids, when the trunk is instantly cleared of all residue, giving efficient cleaning and saving a considerable amount of time and labor.

"The grids are usually supplied in series of five per set, and with each set is supplied a feed and delivery mouthpiece, with a special guider plate to the feed mouthpiece to conduct the cotton direct into the trunks, thus preventing choking at the mouth, which is very detrimental. The standard size of trunk is four feet long by one foot wide, and is generally supplied in lengths totaling 20 feet. The trunks can be fixed either to walls or ceilings (from beams or girders) or fixed to the floor. In either case the makers supply the necessary floorstands, brackets and hangers. To facilitate cleaning and attention to the trunks, the makers advise that wherever practicable the trunks should be fixed to the floor. Existing exhaust opener plants can have the patent vibro-pneumatic trunk attached in lieu of the existing type, as when complete with feed and delivery mouthpieces they are ready for coupling straight to the exhaust conveyor piping.

"The outstanding advantage experienced with the adoption of this new dust trunk, according to users, is that an additional efficient cleaning point is obtained, without the semblance of damage to the staple. This valuable advantage is obtained at the cost of a small initial outlay, in connection with which, it should be stated, there is no replacement of parts required; no driving; no loss of good fiber; and no attention required except when cleaning, the



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time for which is reduced to the minimum."

When this trunk was first developed I was very much interested in it, and have had experience in a small way with it. I find by the tests I have been able to make in a short time that much better results are obtained than with the ordinary type of trunk

In reading through your June issue, I thought it might be of interest to some of your readers, and particularly those in Texas, to know that several English mills are installing this new trunk in the place of the old rigid type, and are universally obtaining this improvement in cleaning.

I hope to be able to forward you further news regarding cleaning of cotton at a later date, as this matter is considered of the utmost importance, particularly among the English mills, and every improvement where it is claimed that cotton can be cleaned without harsh treatment to the fiber is always of interest to me, and in my opinion is well worth trying if the cost of the experiment is not great.

In closing I would add that any information regarding the opening or cleaning of cotton is of much interest to me, and I am always pleased to learn of the various methods employed in your country.

E. S. (England).

The Value of Deliquescents.

EDITOR COTTON:

Regarding the letter from your reader who signs himself "Thirsty Cotton (Mass.)" on "Sized Warps as a Factor in Weave Room Humidity."

Undoubtedly the production and efficiency of a weave room depends on the degree of humidity, and increased humidity, up to a certain point, means increased production and efficiency. However, unless a sizing mixture contains an exceptionally high percentage of deliquescent chemical I do not think the size formula has a very important influence on the degree of humidity which is required.

Very few size mixtures contain a sufficient amount of deliquescent to really influence the regain of moisture by the warp. Invariably the sizing compound used is depended upon to supply the "moisture attracting agency," and no further addition is made to the kettle of size. This being the case, there is rarely sufficient present to function perceptably.

I have personally analyzed during the past year, thirty of the popular sizing compounds on the market, and the average content of deliquescent chemical of the whole thirty compounds was only 0.85 per cent, the highest amount found in any one compound being 5.38 per cent.

This maximum amount found, would be insufficient to be of service unless the compound was used in very large quantity per kettle of size. To illustrate my point, I give the results of some experimental work carried out on this problem . . . the "Value of Deliquescents."

The most powerful deliquescent is Calcium Chloride. I carried out numerous experiments to determine the amount of this chemical which would be necessary to be present in a sizing mixture of the following formula:

Starch	100 lbs.
Sizing compound	15 lbs.
Finished size	100 gals.

and giving a resulting added size to the warp of 10 per cent, to attract an additional ½ per cent of moisture to a warp containing its natural amount of moisture. I found that to attract this additional ½ per cent of moisture, 3.595 lbs. of Calcium Chloride must be present in the 100 gallons of size. If the sizing compound is depended upon to attract the moisture, then the 15 pounds used in this mixture would necessarily have to contain 3.595 pounds, or 23.93 per cent. It is possible, therefore, to appreciate the extent of the "moisture attracting" ability of these compounds that contain up to 5 per cent of Calcium Chloride.

On the same basis, and using Glycerin, it would be necessary to have present in 100 gallons of size, 12.315 pounds, to attract the additional ½ per cent of moisture to the warp, or the compound would contain 82.0 per cent of Glycerin.

I consequently conclude that the excess moisture attracted to the warp, by the average size mixture is so small in quantity that it would be difficult to detect it by ordinary methods. In fact, in a number of cases I believe the sized warp never regains its natural amount of moisture, owing to the almost waterproof film that is deposited over the surface of the yarn by some of the sizing formulae used.

On the other hand, it is possible that the degree of humidity required for the best weaving conditions may be lowered by the presence of more lubricant—tallow—in the size.

The "dust" problem spoken of by "Thirsty Cotton" is not necessarily due to lack of deliquescent, and the addition of these chemicals will not necessarily overcome the trouble. However, it is possible that much may be accomplished in overcoming it by increasing the amount of tallow per kettle, thus giving greater lubrication efficiency at the same time, and probably enabling the degree of humidity to be lessened, as well. This "dust" may also be overcome by adding a quantity of gum to the size.

N. P. R. (Ill.)

Slashing and Sizing.

EDITOR COTTON:

This letter reverts back in reference to the discussion of "Contributor No. 14" and "Mack (Ga.)" regarding slashing and sizing. May I say with regard to them that it strikes me neither of these men understands the other and it seems that "Contributor No. 14" is on plain or grey work while "Mack (Ga.)" is running colored work, including fancy weaves.

During this discussion, "Contributor No. 14" asked a number of questions that I am writing this letter to express my opinion upon, for the consideration of your readers. My answers will all refer to plain or grey work, as that is the product of my mill.

The question: "What percentage of softening do you put in the size kettle to every 100 pounds of water; how much water do you put in; and do you boil the mixture, and then add sufficient water to fill the size kettle, or do you start with all the water you intend to use?"

My answer: To every 100 pounds of thin boiling starch —which is what I am using—I put in 14 per cent of softener which analyzes: 69 per cent fat in the sizing compound. I use approximately 90 per cent water or 90 gal-

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KNEW WHAT R & H CUSTOMERS
KNOW—THERE WOULD BE TIME FOR
MORE GOLF AND LESS WORRY.

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WITH DUE ACKNOWLEDGMENT

lons. When prepared in the size kettle I turn the steam on to boil it, taking note of the time, and let the steam stay on for two hours at about 90 pounds pressure. Thus it boils for one hour and fifty minutes, approximately. Then I transfer it to the storage tank, which is kept at a heat of about 210 degrees Fahrenheit. I use the circulating system on the size boxes circulating the size from the storage tank. I try to keep the size at a temperature of 200 degrees in the slasher size box, using an automatic steam controller on the size box. I do not add water after boiling, as I have a gauge and know just how much water to start boiling the kettle with, and when through boiling the kettle the tanks are full.

"How often do you clean the size boxes and what system have you?" is next asked. The system I use is to clean them out thoroughly, rinsing them out with water at the close of each day's work. I use the positive drive on the slasher, and I think it is a great advantage over the old friction drive.

As to leasing out the yarn on the slasher, I will say that this depends on how many laps I have on the warper beams behind the slasher. This I do with the string lease, by placing them between each sheet of thread so that they will come out on the front of the slasher so as to be separated from one another as they go over the lease rods on the front. This will cause them to separate from each other and there will be no two together.

As to filing off the sharp edges of the loom beam heads, they are supposed to be smooth when we start using them, but sometimes they get damaged after they have been in service for some time. This can be more easily found out when an empty beam is replaced on the slasher, by holding the hand against the edges of the beam head. Then by having a file handy a man can dress the edges while the beam is in operation. By having the slasher man look after this the expense of an extra man will be eliminated.

Regarding the ends counted off in the leasing comb, this is best done by figuring how many ends there are behind the slasher, dividing them up according to the dents you have in the combs in front of the slasher and sufficient lease rods to separate them individually.

And as to the tying-in man, "Contributor No. 14" has the right dope, for the tying-in man can invariably tell when the sizing is done properly, by the looks of the yarn, and its smoothness, together with the manner in which his selectors are working on the tying-in machine; if the sizing is not properly done his stumbles will be great and he will begin complaining that there is something wrong at the slashers. Of course we understand that there are little neps and rough places on the yarn that will cause the selectors to stumble, and be aggravating, but usually this is taken into consideration in choosing the proper selector for the number of yarn run.

In a more recent issue, I notice that "Mack" criticizes "Contributor No. 14" on the matter of a regular system of counting off ends and leasing. "Mack" seems to do a lot of criticizing but avoids the main question and jumps to the question of fancy pattern work. As I have understood the question all along, "Contributor No. 14" is on plain work, and "Mack" says, "Getting back to white or plain slashing, the split rods are placed between each section or division, which is no lease." Anything that makes a separation is a lease, and threads that are not leased and allowed to be sized together will give trouble on the tying-in machine. The tying-in man may not know much about slashing, but he can tell you when the work is coming right. "Mack" talks about first-class slasher men. The slasher men are going to be what you make them because they are going to follow the leader.

I had no intention of "butting in" on this discussion, but I thought perhaps I might strike a "happy medium." I shall look for their further letters with interest.

T. A. D. (Ga.)

An Old-Timer Says—

(*Continued from page* 1149.)

but you got huffy and thought I was reflecting upon your personal character. You didn't catch my thought at all. You see there is quite a difference between character and morals—the thought you had was pertaining to your morals. One meaning of the word "moral" is: pertaining to action with reference to right or wrong. We too often confuse the word character with this meaning.

The thought I want to get home to you, Jim, is that *strength of character is the application of the power of a man's will to enable him to bear up under reverses and to finally realize what he sets out to accomplish.* In fact, strength of character and perseverance are closely enough related to be first cousins or possibly half-brothers.

At no time in the history of the world has strength of character been so important to a man's success as at present, when education has made competition for high positions so keen.

We all feel the call, so to speak, for the big job, but how few of us can make the personal sacrifices required to reach the goal!

Strength of character is not a simple thing, Jim. It is the result of a determined and powerful effort to exert the *will* upon a single point—the control of yourself.

Most any man knows that he *should* study but has he the control over himself to do it? Most any man knows he *should* run his job better than he does, but can he make himself do it?

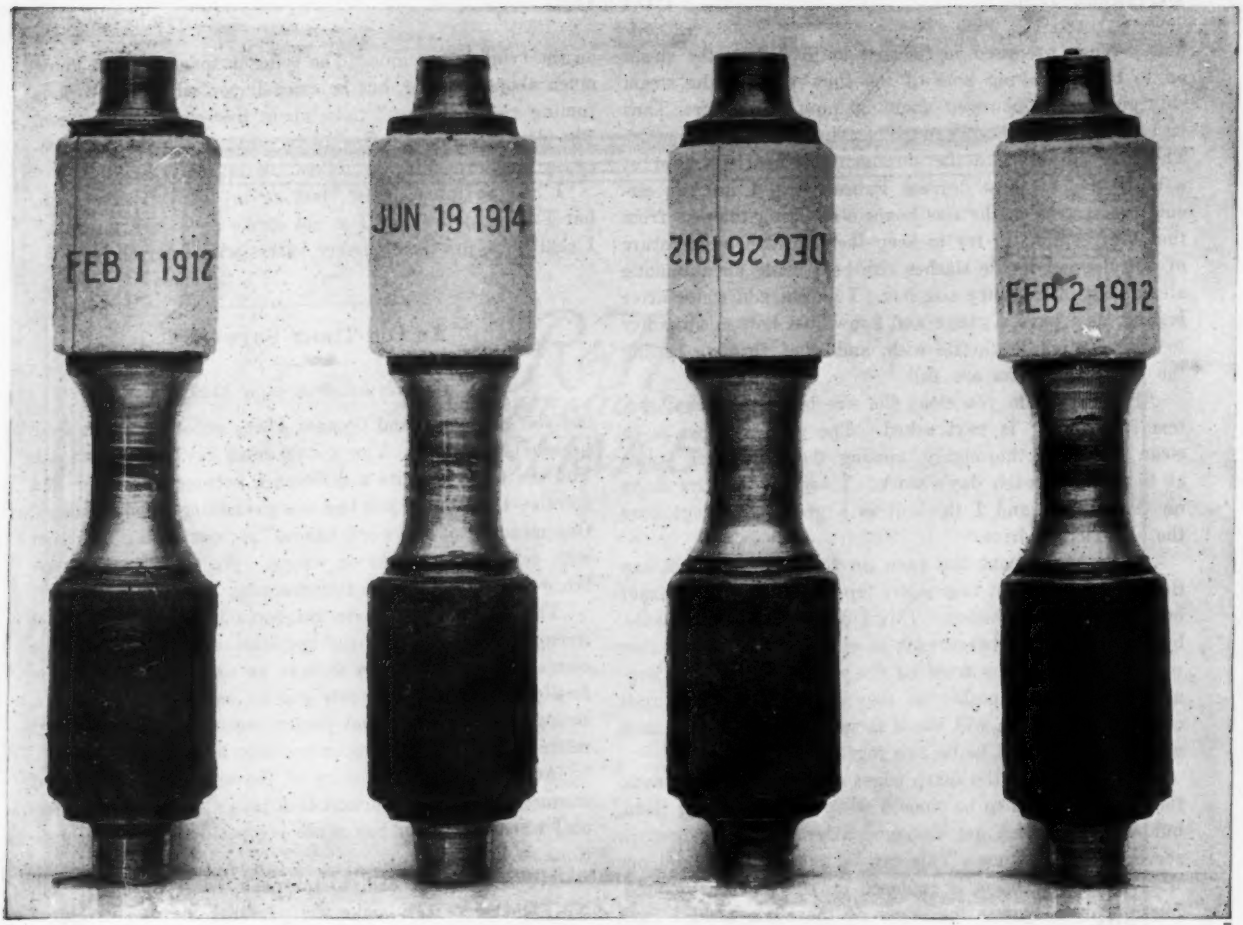
All of us know our bad habits, but are we strong enough to overcome them? See the point, Jim?

It is not that men do not *know* what it takes to make a successful man; it is lack of *strength of character* that keeps them always slipping back. Some men are so weak that they pity themselves by saying, "I was made that way, and I cannot make myself over again." They pretend that they are not able to change the *character* of the very habits which are holding them back.

If we expect to rise above others, we must first rise above ourselves, so to speak. We must cultivate that strength of character which makes us master over that natural inclination to drift along with the crowd. The phrase "the struggle for life" has been much abused—that very thought is holding many a good superintendent on an overseer's job. I would change that phrase to read "the joy of life" instead of "the struggle for life."

Goodness, Jim, can you think of anything that can give a man more real joy in life than to realize he has risen above the crowd and has made his mark in the world? Can you remember a happier day in your life than when you were given your first overseer's job?

To *surpass himself* will always be the goal that the man



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Take two spinning frames, running on the same yarn, using the same roving, and everything equal, except the Cloth used under the skins. One frame has rolls covered with low cost Cloth, and the other uses KNOXALL Roller Cloth.

RESULT

The first frame will produce 10% less Yarn, 10% more waste, consume 10% more power than will the frame, rolls of which are covered with KNOXALL Cloth.

BEAR THIS IN MIND—

KNOXALL Roller Cloth on your rolls not only makes BETTER yarn, INCREASES your PRODUCTION, makes LESS WASTE, but will pay for itself in the NEATNESS of the spinning room. It costs money to keep clean.

See that your rolls are covered with KNOXALL Cloth and that the date is stamped on each roll. YOU will be PLEASED with the RESULTS which you obtain. Beware of merchandise represented to be "just as good."

Insist on Knoxall

Edward H. Best & Co.
Boston

who has strength of character will strive for.

Strength of character does not mean that you can control your feelings; but it does mean that you can and will control your actions.

(Pardon me for making a personal illustration: There is a "movie" on tonight that I wanted very much to see. I actually had on my hat and was leaving my room, but my conscience told me that I should prepare this article for my readers. I can see the movie building from where I sit—it is long ago dark, and I have that "joyful" feeling of being *master of myself.*)

It will always require some effort, Jim, not to yield to your feelings, but as a man's muscles will grow stronger with use, so will strength of character grow stronger with use.

Don't make the mistake of attempting to make yourself over in a day. I have explained to you many times that the fellow who jumps at anything under the impulse of his first thought or determination is not the man who finally gets that large salary, but it is the man who strengthens his character a little every day—and continues every day thereafter.

Remember the fable of the Tortoise and the Hare? Well, my friend, that is a very old and simple fable, but no truer one was ever written.

The finest victory that any man can put to his credit is that of being able to say he is *master of himself.*

By George! I didn't realize it was so late, Jim.

Come over to the house some night and we'll see if you understand what I mean by strength of character.

All right, Old Timer, I'll be over some time next month. Good night.

So long, Jim!

Frame Speed and Cone Outline.

EDITOR COTTON:

When I write for the discussion department, I have the interest of the readers at heart. I always try to convey useful knowledge that may prove helpful in their everyday life. My object in writing my first article on the subject of cone outlines was to prove that to decrease or increase the speed of any fly frame requires the greatest consideration as regards the intermediate speeds.

In the March issue of COTTON I find an article by "H. H. Y." entitled, "Frame Speed and Cone Outline." In reading between the lines of this article, it is plain to me that "H. H. Y." is a man who lives in terms of higher mathematics. He has his mind so centered on mathematics, it seems, that he holds to the subject only in spots. Let's take his article apart and examine it.

In the first paragraph he does not consider the mathematical part of the proof so important as some of the readers do, and in the last paragraph he reminds us that he will accept only strictly mathematical proof.

In the third paragraph "H. H. Y." claims that the speed of the frame does not enter the equation at all, and goes on to prove this statement. In the twelfth paragraph, he says, "It makes no difference whether we get it by the combination (290 — 280 = 10) or by the combination (100 — 90 = 10). Does it? The above fundamental equation (1) is fulfilled in both cases."

This is great stuff. But the sad part of it is, you get only the fundamental part, but you are away off on the condensation of the strand added to the bobbin, which difference is not found by the equation. At this point is it not fair to assume that "H. H. Y." never saw a fly frame in operation on high and low speeds? Just think of it, here is a man that would have us believe that he really understands the functions of the winding-on by employing only as proof the curve outline of the cones. It is plain to all of us that he has no knowledge of the amount of pressure at the termination of the paddle between a high and a low speeded frame. "H. H. Y." refers to page 326 of February, 1923, issue of COTTON and says, "But one thing is sure, if one of them satisfies our equations, the other can't."

What I said on page 326 of the February, 1923, issue was in an article presented at the National Association of Cotton Manufacturers semi-annual meeting No. 85, Saratoga Springs, N. Y. This will give "H. H. Y." something to think about. The boys will please note that "H. H. Y." has ignored what I state in the last paragraph of my article entitled, "Frame Speed and Cone Outline," which appeared in the January issue, and which I repeat here in answer to the third paragraph of his letter: "A fly frame run at a very slow speed calls for a slacker rack gear which means a larger movement of the rack at every change of the carriage, and at the finish of the set the cone belt will be found at about ¾ of the working area of the cones. Figure it out!"

"H. H. Y." evidently dodged the foregoing, and what an opportunity he missed for the use of equations!

I hope he will try to prove to us how much he knows about unequal conditions.

In the fifth paragraph he is fearful that I don't understand the meaning "hyperbolic curve." I am a graduate of a complete cotton and complete steam engineering course in the I. C. S., and, therefore, should understand. He states also in this paragraph that he has gone too far into mathematics. I fail to see where he has gone into anything only mathematics. What we crave in this department is everyday practical knowledge and not arithmetic.

In the seventh paragraph he gives us the simple equations, "(a) the diameter of one cone, (b) the diameter of the other corresponding to the first one." I do not understand these simple equations. I hope "H. H. Y." will clarify them when he answers this letter.

What I wish to know is (1) if Bodden or Dunn flyers, which is the bottom cone, (a) or (b), and (2) what type of compound or differential? What I am after is how to get the relationship between the cones and flyers by equations.

It will prove very useful if "H. H. Y." will only tell us how.

In regards to what "H. H. Y." states regarding Mr. Taggart and Professor Parker, let me say that Mr. Taggart, like "H. H. Y.," has much to learn about fly frames, especially the flyer lead type. On the other hand, I have always found Mr. Parker's work correct in every way.

In the eleventh paragraph we have more mathematics and he repeats what is found on page 498.

In order to save space, read the fifteenth paragraph where he states, "How can anybody expect to satisfy the equation with these two systems? I think I need not go any further in my proof." For one I would like to have

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"H. H. Y." explain fully why the outlines are different on cones modified for different makes of fly frames? What I mean is, why does the cone on the Howard and Bullough frame have different outlines than that of the Whitin or Saco-Lowell frames? Why?

Now let us go back to paragraph 12 and explain some necessary factors in the designing of cones.

(1) With the Houldsworth compound the bobbin and the spindle revolve at the same speed without the additional compounded speed or additional impetus caused from the cone. For this reason that in consequence of that difference in speed, the cones must be of a different form.

(2) The cones may be figured out theoretically correct with the bobbin and the spindle traveling together aside from the motion of the sun wheel.

Perhaps rather than to say theoretically correct one should say before the additional factors of slippage or difference in tension between the empty and full bobbin due to the slight variation in the pressure of the paddle and the difference in the diameter as the bobbin builds up, the other factors are considered and a pair of cones can be figured out correctly by mathematical methods.

After these mathematically correct cones have been arrived at, several other factors including the foregoing have to be reckoned with and the form of the cones modified. Each of these factors in part can be arrived at mathematically, but some, such as the amount of compression in the building up of the bobbin, at least have been checked up, in addition to a mathematical computation.

Therefore, the cones have to be modified to get a uniform tension from empty to full bobbin. My belief is that these additional factors sufficiently complicate the making of the correct form of cones without the added complication of difference in speed between the spindle and the bobbin. Still another way of looking at it is that, with the cones correct when the bobbin and the spindle travel together, there must first be added the modification to take care of the difference due to the difference in speed between the spindle and bobbin and then you have the foundation cones on which to build or modify the form to take care of these other factors. This foundation cannot be as simple, and therefore as sure as the foundation of a pair of cones mathematically correct and easily arrived at with the spindle and bobbin traveling together. It follows then that any compound or differential such as that requiring a high speed bottom cone cannot give as good a tension as a compound of the Houldsworth principle.

This should be proof enough that not only the type of the flyer knocks out "H. H. Y.'s" equation, but also the difference in the type of compound or differential. Builders of fly frames will tell you that variation in speed between one frame and another will require a different cone and that different cottons and different hanks to give a perfect tension will require different cones. By having a cone for different ranges of hanks and the frame run at precisely the speed at which the cones were modified and for which the flyers are built, a practically perfect tension is accomplished.

(3) The diameter of the strand does not remain the same. As a matter of fact the strand as it is laid upon the bobbin is of a less diameter, or occupies less space, at the

beginning than it does at the finish of a bobbin. This increase is very gradual, but constant, and is caused by the pressure of the presser condensing the strand. This pressure is greatest when the bobbin is empty or small, and lightest at the finish or full bobbin. Equations do not count in such a case as that referred to.

Now with this in mind, will "H. H. Y." explain, if he can now see a difference in the combination (290 — 280 = 10) and the combination of (100 — 90 = 10)?

In the thirteenth paragraph "H. H. Y.'s" statement is a confession that he is no practical man. He states, "As the two axises of cones are parallel, and as the length of the belt is constant, it is obvious that at any point the sum of the two diameters plus the distance between their axises must be equal to a constant in order that the belt will not run loose at one time and tight at another." Cone belts are not constant in length. Again, to prove that it is impossible for the cone belt to run loose at one time and tight at another, just break the cone belt, and please notice how much lower the cone will drop, that is unless the cone belt is too slack and giving trouble to the tender. All the defenders of fly frames seem to bring out their imperfection more than I do. On all fly frames the weight of the cone and all the castings for its reception is carried by the belt, that is why you must use special belting.

"H. H. Y." would be okeh as a cone designer for intermediates or finisher lappers, but he has much to learn before he can successfully design and modify cones for the cotton roving frame. Wash. (R. I.)

A Mill Experience.

EDITOR COTTON:

Yesterday I visited Ed, a brother superintendent, a friend of mine and a darn good mill man. In the conversation I referred to a certain article in the current issue of COTTON, and from his reply, I could tell he hadn't read it.

"What's the matter, Ed? didn't your copy come this month?" I asked. The issue had been out about ten days. "Oh, yes," he replied with a sigh, "but you know, Charlie, I don't get time to read the magazines; I'm too busy. I know they have good stuff in them, and a fellow ought to keep up with them, and when COTTON comes in I promise myself I'll read *this* issue, and then something'll happen in the mill, or a bunch of size salesmen'll come to visit with me, and then a lot of circulars and advertising matter will come in, and—well, you know how it is, Charlie."

"Yes, I know, Ed, but you're overlooking some good bets by doing that. I have the same interruptions that you do, all those fellows come to see me, too; but I read COTTON anyhow, and here's how I do it:

"COTTON doesn't come but once a month, and there are generally about thirty days in a month—and thirty evenings. When my copy comes in, I open it up, turn through the advertising pages to see if anything new has come out, and then I take the magazine home that night. Then, one night a week, say Tuesday, I set aside for reading up on information pertaining to my business, which is the mill. After supper and when the kids are in bed, and my wife is visiting the neighbors or darning my socks, I fill up my pipe and reach over and get COTTON and start in.

"Everything in there doesn't appeal to my work, directly, of course. The publishers have to put out a paper to interest a wide variety of men. But the first thing I do is to run through the reading pages and mentally pick out what I want to read. I always read those sectional meeting reports; even if I don't finish them at one sitting I mark my place and go back to it.

"By systematzing my reading, I can keep up with what is being discussed by the men all over the country. It doesn't take long to fall into a systematic habit like that, and it'll pay you.

"When I finish a copy, I file it away for future reference. A year's file doesn't take up much more room than the family dictionary. Then some rainy Sunday afternoon when it's too wet to take the madam and the kids riding, I go back and refresh my mind.

"It'll pay you, Ed. There's no time like the present. Get that copy off the filing cabinet and take it home tonight."

"Thanks, Charlie, I'll try it. Come on, let's go in the mill; I've got up a spooler tension device for filling wind I want to show you." O. D. (Ga.)

After-Chroming.

EDITOR COTTON:

Will you please have some of the contributors to the discussion department answer this query: Why do some dyers use an after-chroming process in dyeing black or some colors on wool? I. C. (Minn.)

EDITOR COTTON:

Replying to "I. C." I would say that the afterchrome method is to so use up the chrome that when the old liquor is used over again there will be no falling down of the color lake when the dyestuff for the next batch is added. By the execution of a longer boil and the addition of formic acid I have no doubt that this can be accomplished, at least in some cases. The chrome and the dyestuff is fairly exhausted in the old way (without the formic acid) so far as the financial value is concerned, but the addition of formic, or other acid, saves the steam, for it is mainly the steam in the liquor that is saved. There is of course the cost of the formic acid set against this, and the much longer steam boil and what may be a larger item than this; the extra cost of time that the machine is used for the extra souring, chroming, boiling, etc. There must be a thorough exhaust to the bath of dye, etc., this of course means extra acid and a good boil. It does not mean a stronger acid, for it often happens that sulphuric acid, which is stronger, overdoes matters and makes the goods (wool) brown and tender.

Quite a lot of the after chroming colors are not very soluble in strongly acid liquors. In the case of sulphuric acid they give what appears a very thorough exhaust, but it really is a very false one for the color has simply been precipitated on the wool which has collected it like a filter. In this case the dyeing will be (finally) very dirty, it will rub badly and bleed badly in soap. Some of the afterchrome colors will stand sulphuric acid, but it will be found that such is the vagaries of the dyestuff that there is a choice of several acids, beginning with what we may call the weakest acetic acid which is the best, lactic the next, then oxalic, and then formic. Formic acid is con-

sidered next to sulphuric, but acetic acid is my favorite. Hydrochloric acid is not often used but may be tried after the formic acid.

It is better to add the acid gradually as the goods are run, though it may be put in all at the beginning of the boil, this will depend upon the solubility of the dyestuff. If the boiling or dyeing of the goods are in the charge of an attendant or common hand everything had better be put in at once at the beginning of the boil.

W. B. (Maine)

How Can This Yarn Be Improved?

EDITOR COTTON:

A few days ago I made a sample of 26s yarn out of 1 1/16-inch stock, and the boss spinner said it was fair, while I thought it was very good. Its average breaking strength is 70 pounds. Here is what I used:

11-ounce lap; 45-grain card sliver; 55-grain railway sliver; 55-grain finish sliver; .60-hank slubber roving; 1.80-hank intermediate; and a 6.00-hank fine frame roving. Could any of your readers tell me where my fault is if it can be made better. I was very careful about setting the rolls, and my cards are in very good shape, taking out a good percentage of waste and making a fine sliver.

E. A. G. (N. H.)

Some Fine Points on Combing.

EDITOR COTTON:

The process of combing is used only when the finer qualities and higher-priced yarns are to be spun, for the treatment received by the cotton from the comber is so thorough that there is a larger percentage of waste made—according to how the comber is set and the grade of cotton to be combed—so economical reasons forbid the combing of cotton unless the kind of yarns mentioned are to be spun. Even then it is the desire of those who comb yarn to do so at the lowest possible cost and at the same time produce yarn absolutely free from all foreign matter, and the latter object has never really been accomplished.

Two impurities that are most difficult for the comber to remove are neps and leaf, neps being the worst, for some of the leaf is taken care of in preceding processes, and any mill that has come near attaining their object has done so at a high cost and then the cotton contains only a low percentage of the impurities. Taking out a high percentage of waste and combing a light lap, also using a light feed, is necessary for the best work. Some mills I know of have made a change in the half-lap set-over, using finer needles and putting more per inch, but having had practical experience with these fine half-laps, I fail to see any improvement therefrom; in fact, there is as much chance to do damage as there is for improvement, as I will try to point out in a further article on this subject which I shall prepare for a later issue of COTTON.

I have found, from my practical experience in combing cotton, that over 90 per cent of the comber men do not know the real fine points of combing. If they did, they would show their overseers and superintendents that the cost of producing combed yarns can be reduced a great deal and the desired quality still secured. They forget that the overseer or superintendent does not have the chance that they have to watch for these fine points. And even if they are not benefited through the pay envelope, in doing these things they are getting more knowledge and a good reputation.

In making the foregoing statement about comber men, I do not question their ability as to re-setting a comber. They may be able to set one as good as the next man, but a great many men think because they are getting a good piecing and the combers are running well, that everything is all right. Very few think of watching the sliver in the pan very closely to see what amount of foreign matter is getting by the comber and *how* it is getting by. If the cotton contains neps and leaf when it reaches the comber, the comber man cannot set the machine to remove all of it, under the existing method of combing cotton, but the machine can be set to improve the work.

I am surprised at the number of mill men who are under the impression that all the cotton is treated by the half-lap and then drawn through the top comb. (Some say that the latter combs only the tail-ends of the fibers. Yes, of some, but pretty near the whole length of some fibers, as I will show further on.)

How many know that the half-lap only combs 50 per cent of the cotton and the top comb about 75 per cent? These figures are pretty nearly, although not altogether, accurate, but will serve for my claim, and the following illustration will show where I get these figures, and how the half-lap and top comb work only about the amounts of cotton mentioned.

Go to a comber that is running and stop it after the separation is completed and the nippers closed tight, holding the tuft of cotton to be combed by the half-lap. Now, the first row of needles are under the nippers ready to work that cotton, so have someone turn the comber by hand, and you will find the half-lap comes around and penetrates the cotton, removing all the short fiber and foreign matter from it, that the half-lap can get at. After the half-lap has passed through the cotton, we have the tips of the lap ready to present to the detaching rolls with the longest fibers foremost, and as they are being presented to the rolls, the nippers open and the feed rolls have commenced to feed, so when the tips of the laps are seized or gripped by the detaching rolls through their detaching motion, the top comb then drops into the cotton or lap, and through the detaching motion of the rollers, the long fibers are drawn through the top comb.

Wishing to make the illustration as brief as possible, I have given the time of action of the parts spoken of as near as possible, although I am aware that the Heilman type has different times of feeding owing to being made by different concerns, and then the Nasmith comber feeding is done through the oscillating motion of the nipper frames—so much has to be considered.

The readers who are well acquainted with combers and who have followed me closely have no doubt seen into the whole thing and noted the amount that the half-lap and top comb works, but to make it plainer for those who are not so thoroughly acquainted with the machine, I will go over my illustration again and point out where the cotton *is* and *is not* combed by these parts.

The nippers are closed tight, holding the lap, and the half-lap comes around and combs the cotton hanging from the nippers. After the last row of needles has passed

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through the cotton, stop the comber and look at the cotton that has been combed, and notice the length of it, which we will assume is ¾ inch—meaning the longest fibers protruding from the nippers. So if a man is combing 1-inch staple cotton there is ¼ inch of the longest fibers not being touched by the half-lap, and also the remaining lengths of the fibers that are protruding from the nipper from ¾ inch down to ⅛ inch or so. Of the fibers only protruding ⅛ inch, we have ⅞ inch not touched.

After the half-lap has passed through the cotton the feed rolls commence to feed and the nippers open and the detaching rolls grip or seize the fibers. About the same time the top comb drops into the cotton, so the top comb does not act upon the length of cotton from the point of the bite of the rolls to the point where the needles of the top comb are about to enter or penetrate the cotton—and that length is pretty near the length that is combed by the half-lap. Going back to where the comber is feeding, the amount of lap fed contains the remaining lengths of the fibers combed by the half-lap and also other fibers, which, when the separation is completed through the motion of the detaching rolls and nipper frames, parts of their length along with the short fiber held back by the top comb will be hanging or protruding from the nippers when the latter are closed tight ready for the half-lap to come around again to remove the short fiber, foreign matter and at the same time comb the cotton held by the nippers.

In the illustration, I showed how the half-lap treated three-quarters of the length of some fibers and only one-eighth of others, so that leaves a little better than 50 per cent not touched by the half-lap, but in assuming there was ¾ inch of cotton protruding, I was allowing for the heaviest feed and at the same time only allowing ¼ to insure a good tight grip on the cotton by the nippers when closed, and it needs at least that to stand the strain of 17 rows of needles going through the cotton at the speed they do, and to cover the distance from the bite of the nipper knife and cushion or nipper plate to where the needles are entering the cotton.

The length of the fibers on which the top comb does not work is only approximate, as it is subject to variation according to the timings and settings of the comb, and then the method of setting and timing the latter on the Heilmann and Nasmith combers are different. The readers who have Nasmith combers will see that I have given the motions of that machine, but my claim also applies to the Heilmann comber.

Not wishing to occupy more space than is necessary, it is my intention to give practical proof to my statements, and this same proof can be put into practice by the readers, by going to a comber and stopping it after the last row of needles on the half-lap has passed through the cotton and then measuring the length held by the nippers if possible. Then take out the leather detaching rolls and clean out the sliver from the bottom steel roll, also out of the sliver pan, and put the rolls back into place and turn the comber by hand, or have someone else do it, until the detaching and separation is completed. Then again take out the rolls carefully and pick up the sliver that has been drawn through the detaching rolls and compare the length with the length that was combed by the half-lap. The result is my proof. The use of a pencil may be necessary in assisting the fibers through the second pair of rolls on a Nasmith for the suction from the fan and brushes may cause them to lap around the bottom steel roll as the tips of the fibers have nothing to cling to as when a piecing is effected.

Another way to find the length of sliver drawn through the roll is to find the length detached, which is the same all the time. In doing that the piecing should be made as soon as the detaching is done; if not, allowance must be made.

Now, all the length of that sliver drawn through the detaching rolls has been combed, part of it by the half-lap and the rest by the top comb, as has been shown, but yet we find neps in the sliver, also a little leaf. The reason is: how can the top comb with only two rows of needles—and in many cases only one row—be expected to do the work of seventeen rows in the half-lap, and at the same time treat a greater length of sliver. If the amount of work to be done was vice versa, then there would be less neps in the yarn. The comber, as some would think, does not make neps, except when combing long cotton, and then the neps—or as I would call them, bunches—are delivered into the waste at the back and that trouble is very easily remedied by adjusting the setting and timing.

So long as the comber receives cotton containing neps, the present way and time of feeding, in my opinion, is an evil to the progress of producing quality yarn absolutely free from neps, but that way and time of feeding is essential under the present method of combing. A further proof of my claim regarding the amount of work that the top comb does is the double top comb, and when employing two rows, one of them is made up of flat needles which means more strength. The makers recomend the double top combs for coarse work, and in doing so they must have had other ideas in view and must have known what amount of work the top comb has to do.

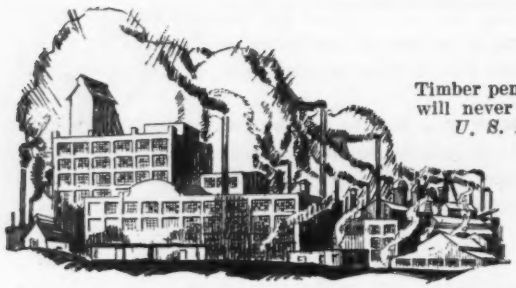
Parts of my letter may read as though I question the ability of the comber, but that is not so. I am an advocate of that machine and if anyone who does question its ability really knew what the comber has to contend with, and what it accomplishes under the existing method, they would use a little more judgment in their comments.

I wish to draw attention to the amount of cotton I said was combed by the half-lap and top comb. Those figures are intended to cover the Heilmann and Nasmith type combers, for short and long cotton, different times and amounts of feed, time of detaching and time that top comb starts working. If any of the readers who try the tests do not get corresponding results, they must take into consideration these things and many other things that I have not covered in detail.

For instance, on the Nasmith comber, you back off on the detaching roll from Index 1 to 7 and then pause from Index 7 until 8 and then detach, until Index 21. Therefore, you detach pretty near twice the length you back off—which is about two inches or so; therefore, you detach nearly four inches, so you cannot expect that from the Heilmann type comber as the detaching motion must be considered.

I trust the readers have found my letter at least interesting, for it is my intention as time permits to write more on the comber. In the meantime, let us hear from some other fellows who are making combed yarns.

Jock (Mass.)



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That Lay Gear Proposition.

EDITOR COTTON:

Replying to "Wash's" letter in the June issue, I will say that on all modern fly frames there is a bolt that holds the cone belt guide on the rack bar, and by loosening the nut the guide can be moved until the proper starting tension is obtained. I wish to call "Wash's" especial attention to this fact: Changing the lay gear will not prevent any adjustment of the cone belt guide. I am very much surprised to see a mill man think that changing the lay gear makes it impossible to secure the proper starting tension. I fail to see why "Wash" will be forced to start the frame with the tight tension. Will he please reply and state why he cannot secure the proper starting tension after changing the lay gear as after changing the ratchet or rack gear?

Now let's see if "Wash" is right in regard to building a bobbin of roving, changing gears, and his law of temperature and humidity. Let us consider the nature of cotton. Cotton, being a vegetable fiber, will be closer in wet weather than in dry weather. If we are making a 5-hank roving in wet weather we want the same in dry weather. However, the diameters will not be the same. And the coils will not lie as close in wet weather as in dry weather. If "Wash" is laying his roving just as close as it will possibly lie in wet weather when humidity runs to the extreme, when dry weather comes on the cotton becomes fluffy, the diameter of roving becomes larger, the succeeding coils will undoubtedly ride or tend to ride the preceding coils, thereby causing irregular tensions and stretched roving.

Let me repeat what I said in the April issue regarding relative humidity. A scale for any room is easily obtained and if the humidity is maintained as it can and should be, it is only in very extreme cases that any change is necessary on the roving or fly frames. "Wash" says I am quick to criticize "A. B.," not because of "A. B.," but because what I said regarding the attitude of "Wash" toward percentage of regain and humidity. In connection with the law of temperatures and humidity, I do not think there is a single reader of COTTON who doesn't know the law of temperature and humidity—and that is why humidifiers are so necessary. "Wash's" stretched roving is all his fault, and not the fault of the bobbin-lead frame builders.

T. A. A. (S. C.)

Saving Steam in a Bleaching Plant.

EDITOR COTTON:

We would like to know, through your "How Other Men Manage" department, how to save steam in our bleachery. We are bleaching just two kinds of goods—sheetings, 36-inch, and checks (nainsook finish) also 36-inch. Both are practically the same goods as both are bleached and finished white and both are cut up in our own warehouse. We bleach both in the old-fashioned way, using lime, sour, soda ash, chemic, sours, etc. Please have some of your readers tell us what they know about *steam* in bleaching. E. B. (N. Y.)

EDITOR COTTON:

Replying to "E. B.," I would say that the present price of labor makes labor saving secondary in importance only to the saving of fuel. In plants of 500 boiler horsepower or less, that is, plants using eight to ten tons of coal per twelve hours, the only labor saving devices that may be profitably employed are devices which deliver the coal into the boiler room after weighing or measuring, and arrangements for removal of the ashes so as to keep down the necessity of labor and for the handling and for wheeling coal. In plants of large size, mechanical stokers frequently offer sufficient advantages to warrant the investment necessary to their installation, especially as the efficiency is generally higher than the average of hand firing.

As to how steam can be saved in the bleaching process, there are many bleaching plants that are yet using the lime and soda double boil as the process for their bleaching of cotton goods, whereas the single boil in caustic soda is giving thoroughly satisfactory results for "E. B.'s" class of goods. Of course always providing that the goods are properly wet out and steeped in diastafor previous to admission to the kiers in order to get rid of the cotton wax, cottonseed oil and pectic matters and minerals, etc., inherent to the cotton. Now the result of the single caustic boil process as compared with the double boil lime and soda process is to cut the requisite steam in half and also to cut in half (largely) the amount of fixed charges required in both the kiers and washers, etc. At least the plant output can be increased twice over with very little additional apparatus. Moreover, the length of time of the boil can be reduced, provided the circulation is kept up, and the elimination of the impurities in the goods is larger than the reduction of the steam.

Moreover, an English concern tells of the loss by radiation (external) to be as follows: For every four feet six inches of six-inch pipe uncovered, with steam at 60 pounds pressure, one ton of coal per year is wasted. If covered, only 363 pounds of coal are wasted. Every flanged joint of a six-inch pipe exposes 1.789 feet of surface. This means five joints will waste one ton of coal per year, if they are not covered; 363 pounds of coal to each five joints if covered.

W. B. (Maine)

The Mule Versus the Ring Frame.

EDITOR COTTON:

I quote the following letter which I received from the editor of the Textile Recorder, Manchester, England, this morning, as I think it will interest "J. R. (Pa.)" and probably others, owing to the discussion going on in the pages of COTTON on the mule versus the ring frame.

"Roughly speaking, there are only about 20 per cent of the spindles employed in Lancashire ring spindles, which means about ten million spindles. There are altogether in this country something like fifty-seven million spindles at work, the remainder being mule.

"Mule spinning is not being replaced by ring spinning, the reason being that the mule will produce a better yarn and finer counts than can be spun on the ring frame, and the whole tendency of spinning in this country is to develop quality."

My opinion is, and it is also the opinion of others, if we did not have the protective tariff, England's production of quality goods, soft feel of the cloth and luster in finishing, would compete with us so that a good many textile

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workers would be without jobs, as I have heard it stated by many, we Americans should not buy imported goods, as it is said: buy "American-made goods." This is true, but when people not interested in the textile industry are buying, they are out for the best.

I am hopeful of the extended life of the mule in this country. I admit that the ring frame beats the mule on hard twisted yarns owing to the difficulty of keeping the kinks out. Optimistic (Mass.)

"R" Finishes.

EDITOR COTTON:

Will you please tell us, through your "How Other Men Manage" column, how the R finishes; that is, the R finish, the back-filled R finish and the shrunk R finish, is handled by the English finishers. Any information you may give us on this topic will be greatly appreciated.

B. A. (Mass.)

EDITOR COTTON:

Replying to "B. A.," I will say that I suppose that the cloth for the three R's is bleached and dried in the usual way. In the first place is the R finish itself. The paste for this finish should be made as follows:

Corn starch	25 pounds
Potato starch	25 pounds
White dextrine	60 pounds
Softener (soft soap)	12 pounds
Blue to shade	4 ounces
Water	140 gallons

Boil ten minutes.

The pure R finish can be done with little or no starch, direct off the dryer but the following is the better way: Chase on the mangle two or three times and starch and finish off the beetles.

The R finish wants to be finished so as to look like linen, so it should feel full and the threads be well raised. A good way to finish is to damp heavily, let lie overnight, calender twice on a hot calender by swissing, put on beetles for about three hours, 1½ hours each end. This is a very good imitation for linen, and wants to be thready. That is why they are finished from the beetles and not the calenders.

For the back-filled R finish the goods should be back-filled on the backfilling machine, after mangling and drying, and it should be neither hard nor soft, but feel soft and full for this finish. The size should be as follows:

China clay	60 pounds
Talc	80 pounds
White dextrine	40 pounds
Corn starch	70 pounds
Soluble oil	8 pounds

70 gallons, boil 10 minutes.

The shrunk R finish is generally got by first mangling through hot water in a three-bowl mangle with wooden rolls, conditioned on cans, and stiffened on a three-bowl stiffening mangle with wooden bowls. This finish is characterized by a good full feel and a thready appearance without much, if any, luster. The mangle through boiling hot water causes the cloth to shrink both in width and length, and gives it a fuller, thicker feel.

The shrunk R finish is one that is firm and many factories finish it to be made into napkins. It is not calendered, or if so, lightly, being mostly finished on the beetles. The paste to use is as follows:

Corn starch	75 pounds
White dextrine	75 pounds

Blue to shade, 120 gallons paste. Boil ten minutes.

W. B. (Maine)

A Few Mill Experiences.

EDITOR COTTON:

In the January issue of COTTON I asked some questions relative to the repairing of drawing frame metallic rolls. The metallic roll has not been in use for a much longer period than the present life of the rolls. It is now about time for the rolls to be looked into, considering the time they were first put into service. Having some of the first in service, mine had begun to wear down at the collars and other places and were causing uneven slivers; I therefore asked for information as to whether or not they could be successfully repaired. I knew if I did not ask, no one would know that I wanted to know. Also I knew if anyone asked a question that was out of the ordinary, "Wash (R. I.)" would be the first one to jump onto it, and he did. I am glad he did, as I have been contending that they could not be repaired, or if they could, the ones who built them would be the ones to do it. So I gained my point, for the present anyway, on the roll question; that is, if someone else does not come along and give some easy method for repairing them. Even then, it will have to be tested out to prove it a success. A builder of one of these machines informed me that the one best remedy is, to use the old rolls for some sort of supplies and put in new rolls, so that is what I did.

After working over my drawing frames and getting them into good shape, I found that the collars and the trumpets, and in fact nearly all the calender hang-up needed overhauling.

Getting back to the question—you know an operator has a lot to contend with in a case like this, especially if the manager is not familiar with machinery. You can tell him about a thing that is going down and needs replacing, but he cannot see the point. He thinks that you ought to make it go, and do good work, though age creeps upon machinery as it creeps upon mankind, and we must acknowledge the fact. Reason out a fair length of life for the machinery parts—such parts have to be replaced sooner or later. You buy new shoes oftener than you buy a hat. Why? Because the shoes get harder wear than the hat, which reduces their length of life more rapidly. The same is true with machine parts—the more wear, the more often they have to be replaced.

"Wash" states that swapping the rollers (top rollers) will get you by on a lot of slackness; it is hard to state just why, nevertheless, it is true; just another one of those simple home-made operating remedies for making the thing go and do good work. I have seen, when an end on a drawing frame was running slack, the operative put a chunk of cotton around the collar of the rolls to release the weight so as to allow the slivers to run through; also into the trumpets and on the drawing cans, rather than notify the section foreman of the trouble or without going to the "Higher-ups" for some repairs. The operative knew

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that there had been repeated efforts to obtain those repair parts which had failed, and, therefore, resorted to some sort of home-made remedy and said no more about it. It is true it produced the desired results, but such things are not mechanical according to the true definition of that term.

As to the front roll speed. I have a speed of 285 r.p.m., that is, 280 for the front roll and 290 for the first drawing or the one that takes it from the cards. I have my rolls set to exceed the staple 3/16 of an inch, and I think that is sufficient.

I had an experience recently when installing some new cleaning machines for the picker rooms. I had adopted a certain weight lap as a standard for the finisher man to go by, and upon installing this machine, not thinking about the weights for the finisher's standard, allowed him to weigh them as he had before; consequently, the weights came out heavy, as a result of more dirt, sand and other heavy matter being taken out than was before weighed, considered and taken care of at other places. That was what any wide-awake man should have thought of. I didn't and was caught, and give my experience here as a warning. Don't get caught! Watch! Think! Be quick to act.

Contributor No. 14.

Napping Colored Fabrics.

EDITOR COTTON:

Napping is distinctly a trade by itself. It is not a carding process. It is a branch of the finishing processes. In the carding machine, the wire clothing strikes against the raw cotton head on. That is, the fibers are attacked by having the points of the wires moving toward the stock in process. But while napping takes place, the wire covered clothing strikes the fabric tail on. The back of the wire hits the fabric first with the wire points moving tail on toward the goods in process. Although the wires in the napping machine roller clothing have points as fine as needles, and as sharp as razors, the cloth cannot be injured when the machines are properly adjusted. Unlike the carding machines the napper rolls are not adjusted close together. But the grinding of the napper rolls is conducted in much the same manner as is card grinding. Napping machines should be ground often enough to get around about once per month. It is of the utmost importance to have the wire points sharp. They should be thoroughly cleaned once per week. Adequate dust removing arrangement should be installed to carry off all lint and flyings, etc., from these machines. If any dirt is allowed to float around these machines the napped surface of the goods will be injured and rendered ununiform. Great care should be exercised in the oiling of napping machines. Oil is the great enemy of these machines. If insufficient oil is applied, the bearings will burn out and cause serious fires. Fires in connection with nappers must be strenously guarded against because there is so much loose fibers around and so much opened fabrics that a fire makes rapid headway. Besides this, as these machines are all open, the clothing is easily destroyed along with the valuable belting which is used to drive the rolls.

There is another valuable point to be considered in connection with the oiling of nappers, and that is to avoid having oil running out onto the rolls. If this is not guarded against, the oil will not only soften the wire clothing, but it will also splash oil on the goods in process. There is still another injury which must be guarded against when oiling these machines, and that is the evil of having surplus oil, not needed for regular oiling, get onto the roller belts. When these belts become oil-soaked, they are rendered useless. The oil makes them soft and slippery, and when in this condition the napper rolls do not function, and the cloth merely passes through without being napped.

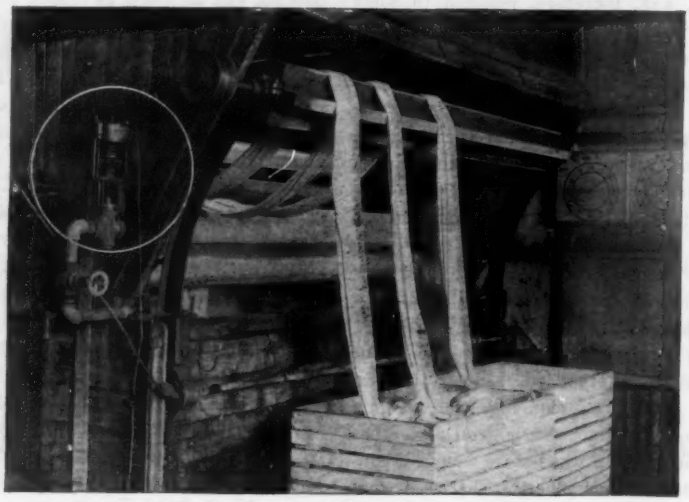
It is also very important that these machines are carefully lined and perfectly leveled. The surface of each roll

NAPPING SCORE SHEET

Date_____

GOODS	STARTED ON FACE	STARTED ON BACK	TOTAL RUNS ON FACE	TOTAL RUNS ON BACK	TOTAL ALL RUNS	TOTAL TIME IN PROCESS	YARDS	REMARS

A Napping Score Sheet.



This Mill has no "streaky" dyed goods —see the reason

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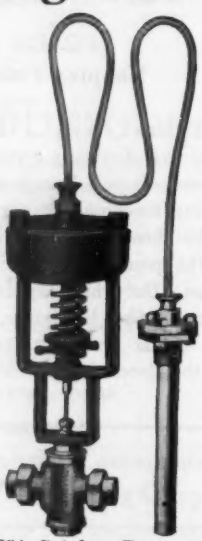

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should be smooth and even, loose wires and dangling wires will tear or otherwise injure the cloth. It is also very important to have the right kind of wire, and also to have it tightly wound onto the rolls. Loose clothing will bulge and cause the cloth to be napped more in one place than another.

Therefore, it is highly important to have everything in proper condition before proceeding to nap any line of goods. In order that there may be no misunderstanding as to the right condition under which to produce superior results during the napping process, the following list of requisites must be carefully considered:

1. Using napping machines adapted for the work desired.
2. Properly lined and leveled.
3. Right kind of clothing.
4. Clothing properly put on.
5. Clothing properly ground.
6. Machines kept clean.
7. Machines properly oiled.
8. Machines adroitly adjusted.
9. Proper oversight.

Regarding the clothing there are many kinds of napping and various degrees of napping. It is important to select the right kind of clothing. There is heavy, medium and light weight goods to be napped. Following this there are also the varying degrees of napping such as the heavy, medium and light naps to be applied to any line of goods. Blankets require a full and heavy napping. Certain lines of heavy clothing fabrics like cottonades also require an especially heavy napping. While there are other goods which must be just barely touched. But between these extremes there are all kinds of napping required.

Therefore it does require the most expert training and experience to meet all of the demands of the carrying trade. Unless a napper is skilled, the goods may be easily spoiled either by napping them unevenly and too much or by rendering them tender. Both are very bad faults and once done it cannot be remedied. The goods are only fit for the rag bag and must be practically given away.

With reference to the real art of napping, it requires the most skillful training to know how to produce the finish desired by the various customers. There are so many different finishes wanted. Some want a light nap on the back and a heavy nap on the face. Others want the reverse of this. Some want a fur-like nap. Another customer wants a sort of a goat's hair nap. Still another may want a felted nap. Some are tentered before or after napping. Some are calendered before or after. And napping machines will respond and produce the exact finsh required when properly operated.

Regarding the wired clothing nothing but the best tempered steel wire should be used, especially where high grade work is desired. For heavy napping it will be best to "break-in" the goods by giving them the first run on a machine equipped with number thirty-two wire bent at an angle of forty-five degrees. This machine may be called the "breaker." This process may be repeated a few times, and then putting the goods over machines with the same wire or on finer wire which is bent an angle of fifty-eight degrees. But in order to produce a fine uniform napped surface it is best to pass the goods over the felting machine. In each process of napping it is important to have the pile on the goods being napped move with the fibers running "tail on" and not "head on." It also makes a big difference when napping goods on both sides, as to whether the napping begins and ends on the face or on the back of the cloth.

Also the total number of runs does not count for much. It is all a matter of expert training as to where to begin and where to end and as to how many runs to give the goods during the operation of napping. Different colors and different patterns do not nap alike. For example, gray mixtures show a much better nap than do black or brown backgrounds.

There should be plenty of live steam in the steam drums on each napper. After the goods have been napped they should also be run through the glossing machine. The finer the wire and the less the angle of the wire on the clothing, the finer ground and the longer it will take to nap the goods. It is highly important to guard against the possibility of having pins, needles or other metallic substances becoming lodged within the goods. This might cause fires, or tear and possibly injure the goods.

Attention must also be given to prevent using the surface of the rolls more in one place than another. This will cause a hollowing or valleying of the wired clothing and then if the fabrics are occasionally transferred to the less used surfaces, the goods will be napped more on part of the cloth than on others.

The art of napping, for sometime, has been used to improve all kinds of goods. Whether made of cotton, wool or silk, also whether woven or knitted. Fine knitted goods have been so perfectly napped that when made into ladies' gloves they are hard to distinguish from the real skin goods.

The best method of following up the work is to keep score sheets as shown by the form.

The face of the goods can always be noted by observing this rule: If the wales on the cloth runs up the cloth from right to left on single yarns, this is the face. If the yarns are plied, the face of the goods is on the side where the wales run up the cloth from left to right. The art of napping is constantly developing and invading new fields. It is now possible to nap by stripes, by spots or big fancy figures on the face of the goods. This is governed by the weave and the pattern of the goods. The art of napping has been used a great deal to imitate woolen finished goods. This is so craftily accomplished that cotton blankets are now made of cotton which resembles wool so closely that it is only a trained person who can tell the difference. Even the wooly curl which is so peculiar to wool has been so closely reproduced as to defy detection.

Napping is now so well developed that it is possible to artificially reproduce short hair fur, silk plushes and velours, also various soft skin goods, such as used for kid gloves, etc.

Raised and embossed figures are also napped to produce novel effects.

The art of napping is therefore becoming one of the greater branches of the ever-progressive textile trades. And a branch of the textile trade which can take a piece of plain cotton goods and make it feel like wool, look like wool, smell like wool and wear like wool, is a trade which the merchandisers must look up to with ever-increasing respect not to say reverence for its wonderful achievement.

H. D. M. (Georgia)

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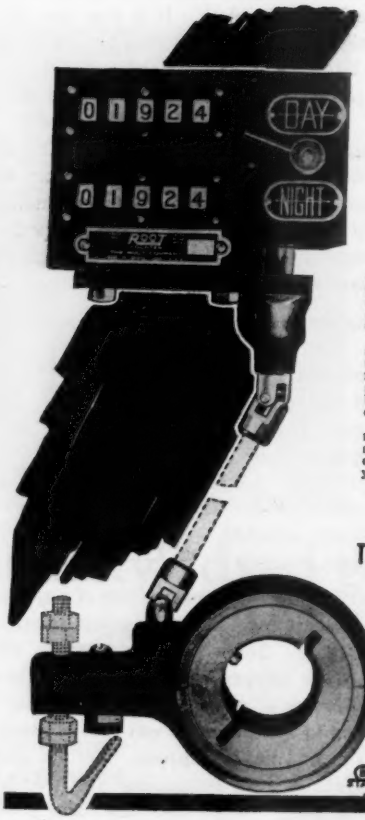

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Jersey City, N. J.
Established 1827
D X N TRADE MARK

Machine Calico Printing.

(*Continued from page* 1134.)

in any proportion with starch or flour and is equally useful for pigment or for mordant colors. When added to starch it increases its penetrative power, and adds to its softness without diminishing its thickness, and makes it easier to wash out of the fabric and produces much more level colors than does starch paste alone. Used by itself it is suitable for printing all kinds of dark grounds on goods that are required to retain a nice soft clothy feel. A tragacanth mucilage may be made either by allowing it to stand for a day or two in contact with cold water or by soaking it for 24 hours in warm water and then boiling it up until it is perfectly smooth and homogeneous. If boiled under pressure it gives a very fine smooth mucilage (not a solution proper) much thinner than if made in the cold.

Gum tragacanth is extensively employed for pale blotches or grounds for delaine printing, and for all first class work in which softness of feel is a desired effect. It is mixed with albumin in the making of pigment printing pastes, and enters into a good many of the dye liquors and "prepares" that are padded on the mangle. In the latter case it tends to equalize the absorption of the liquor by the cloth and insures level padding.

The tragacanth thickening or mucilage used for ordinary "blotch" printing contains from six to eight ounces of gum per gallon (say four to five per cent); stronger mucilages are made (7½ to 10 per cent) but they are employed solely for adjusting the thickness of colors that are too thin, and for mixing with solutions of dyestuffs, etc., in order to bring them up to the right consistency for printing.

Gum Arabic and gum Senegal are both very old thickenings, but their expense prevents them from being used for any but pale delicate tints. They are especially useful thickenings for the light ground colors of soft muslins and sateens on account of the property they possess of dissolving completely out of the fibers of the cloth in the washing process after printing. Starch and artificial gums always leave the cloth somewhat harsh in "feel" unless they are treated specially, and are moreover incapable of yielding the beautifully clear and perfectly even tints resulting from the use of the natural gums. Very dark colors cannot well be obtained with gum arabic and gum senegal thickenings; they come away too much in washing, the gum apparently preventing them from combining fully with the fibers. Stock solutions of these two gums are usually made by dissolving six to eight pounds of either in one gallon of water, either by boiling or in the cold by standing.

British gum or dextrine is prepared by heating starch. It varies considerably in composition, sometimes being only slightly roasted and consequently only being partly converted into dextrin, and at other times being highly torrefied, and almost completely soluble in cold water and very dark in color. Its thickening power decreases and its "gummy" nature increases as the temperature at which it is roasted is raised. The lighter colored gums or dextrins will make a good thickening with from two to three pounds of gum to one gallon of water, but the darkest and most highly calcined require from six to ten pounds per gallon to give a substantial paste. Between these limits all qualities are obtainable. The darkest qualities are very useful for strongly acid colors, and, with the exception of gum senegal, are the best also for strongly alkaline colors and discharges.

Like the natural gums, neither the light nor the dark British gums penetrate into the fiber of the cloth so deeply as pure starch or flour, and are therefore unsuitable for very dark, strong colors. British gums are made from both wheat and corn starch. For most purposes it is immaterial which starch is employed, but if a *yellow British gum* is to be used for thickening strongly alkaline colors like Indigo, a corn starch gum ought to be selected, as corn starch itself forms a much better thickening with strong alkalis than wheat starch. If dextrin or dark British gum is used in conjunction with strong alkalis, any brand may be taken so long as it contains no more than a trace of unconverted starch.

With very few exceptions, British gums of good quality can be used for exactly the same purposes as gum Senegal, the only difference being that they give a somewhat yellower tone to pale shades, and leave the cloth a little harder in feel.

British gum thickenings contain from 20 to 50 per cent of dry gum according to the quantity of free starch they contain; they are simply boiled in water and cooled without any further additions.

(This is the fourth article of a series on this subject by Mr. Nanson. The next will appear in an early issue.—Editor.)

What Other Men Manage With.

(*Continued from page* 1138.)

on one of the ends in the creel. Then watch the action of the succeeding pairs of rolls on it. It will be noted that there is a plucking action and that the resultant yarn will be full of lumps, of thick and thin places, Fig. 4. Exactly the same process takes place in the drawing frame rollers

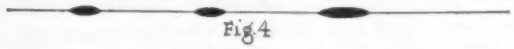


Fig.4

when the sliver acted upon is too bulky. The rollers, always set quite some distance farther apart than the length of staple, will pull out bunches of cotton which will not have the full benefit of the parallelization action that the drawing machine was designed to give.

Another phase of drawing probably not fully considered by the majority of carders or cotton manufacturing students is that of the effects of the insufficient action which the cotton receives when the top rolls slip. For instance, making

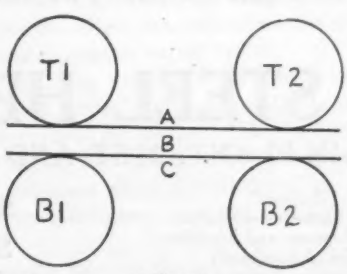
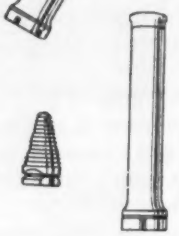


Fig.5

an extreme example, assume a ribbon of cotton thick enough so that the top rollers cannot be weighted heavily enough to bring down less than ¼ of an inch from the bottom rolls Fig. 5.

"Due to the extreme weighting that must be resorted to



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in order for the rolls to have any effect on the thick band, there will result some slippage of the top rolls," declares an analytically inclined friend. "Hence, studying the ensuing action on the cotton going between the rolls, we must concede that in the example given here there are three different speeds affecting the ribbon going through.

"To illustrate: A is intended to represent the fibers composing the upper strata of the sliver, B, those fibers making up the central horizontal portion, and C, the lower surface Since the top rolls, T1 and T2, are slipping, the deduction is logically inferred that the fibers immediately affected by these rollers are being pulled forward less rapidly than would be the case if no slippage of the rolls took place—in other words, their rate of progress is less than that of the fibers acted upon by the non-slipping bottom rolls, B1 and B2.

"The fibers composing the portion B are as between upper and nether millstones. They are somewhat in a state of inertia, acted upon only by their neighbors above and below. So that there is a tendency for the fibers at B to be plucked more than the fibers at either A or C. And the result is that instead of the fibers sliding by one another in response to the roller pull as they ordinarily do when conditions are right, they have a tendency here to resist the full parallelization effect of perfect working drawing rollers."

Ask your friend what he thinks about this. If he is skeptical about the line of reasoning ask him to try a few experiments with extra heavy sliver. The writer feels that the results, if carefully checked up, will corroborate these statements.

It is at the drawings that the carded and combed stock meet again after the circuitous movement of the latter. It is here again that mixtures must be guarded against: And yet there seemingly can be no excuse for mixing the two kinds even if the cottons were of like shading, because the combed sliver has its fibers in a line parallel to the length of the sliver, and is very delicate, with an ever present tendency for it to rupture transversely. On the other hand, the carded sliver fibers are more or less kinky in appearance; so that, if the two slivers were laid side by side, the difference between the two would be instantly detected.

Fig 6

It would be well, however, to note whether there is a special system for preventing a possible juncture of the two cottons.

In some mills, the cans from the cards are of two different colors, so that each class of work is easily identified. At the drawing frames, the cans are furthermore striped—1, 2 or 3 bands to indicate first, second, or third process. Fig. 6. In this way, only rank carelessness, or premeditated deliberation will bring about a mixture, either of the different classes of cotton, or of the various processes of drawing.

Also note if the combed sliver is delivered to the back of the first drawings in spring bottom cans. One mill the writer was in did not have these cans, and despite the assistance of the lifting roll the sliver broke frequently, and furthermore, the sliver from the bottom of the can had a very bad appearance, the fibers protruding from it in great profusion, making it look as though a line of white centipedes was being fed into the machines.

Is there much trouble with single? During the war, single was a bugaboo on the drawing frames, the help being

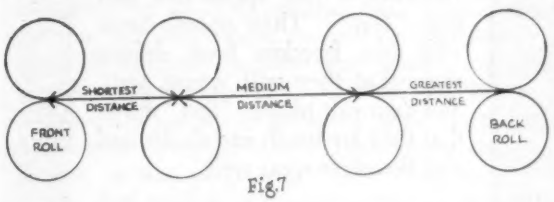

Fig.7

very careless and incompetent, and the machinery given no proper attention for repairs or adjustments.

It is easy sometimes to work up a redhot controversy among mill men using electric stop-motions, and mechanical stop-motions, respectively.

"I'll tell you, frankly, if you give them the proper care, both systems are good," said a carder who had years of experience on both types.

Roller settings can come in for a question or two, although the writer has found less incongruities in regard to them than for other things on the drawing frames. The practice is general to have the center to center distance between the 4th (back) and the 3rd roll, the greatest, decreasing the distance between each subsequent pair of rollers, the distance between the second and first (front) rollers being the smallest. Fig. 7.

This method of setting holds true for the several processes of drawing. The practice also, in regard to the settings for thick, medium, and thin slivers is pretty universal, too. And this is: that the heavier slivers are given wider setting than the lighter ones.

In regard to the weighting of the top rolls, there is a diversity of opinion, and it would be well to make an inquiry here." I prefer the heaviest weights at the back where the sliver is heaviest," one man replied to the question. "I like the weights heaviest where the roll speeds are highest," replies another expert carder.

Be sure to lift up a clearer cover to note the type of top rolls, and don't forget to ask your host what he thinks of the various types on the market. Like the controversy over the electrical vs. the mechanical stop-motion, there is a chance of argument about the merits of the metallic, the leather covered, and more recently, the cork-covered, top rolls.

How are the bores of the trumpets? Sufficiently large to permit the sliver to go through freely, yet small enough to condense the sliver properly? There is always room for an idea as to how a firm changing from heavy to fine sliver and vice versa managed to get over their trumpet troubles.

The disposition of drawing frames seems to be pretty much the same in all mills, with the difference though that in

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some mills the frames run across the room, in others, they parallel the length side. In either case, the arrangement for a three-process drawing would be as in the sketch, Fig. 8. There is, however, a difference of opinion as to just which way of allotting them to the workers is the more efficient one. In some mills, it is the practice to have the attendants take care of the deliveries of one process only, viz., an

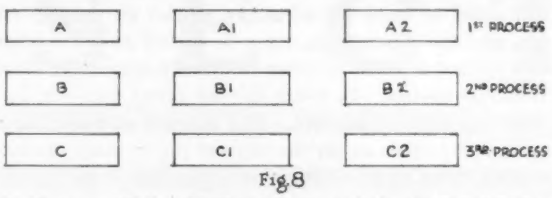

Fig. 8

attendant would handle her quota of deliveries in the first process, probably having all the units in A, A1, and A2. Another worker would have the second process B, B1, and B2, and so on.

Other mills give their drawing operatives deliveries in each of the three processes. For instance, if in the previous case of an operative handling only deliveries in one process, the frames A, A1 and A2, constituted the quota for one worker, then in the second case, a worker would handle three machines, A, B and C.

Proponents of the one process plan say that with their system each worker is a check on the next one and the efficiency of all is increased. Advocates of the three process allotment say that there is less chance of confusion when a worker handles all three processes. What is the method in the mill you are visiting?

The number of deliveries per worker also varies in different places. Don't forget to ask how often the clearers are picked. A question like this one may sound like the one: How old is Ann? The writer asking it in many mills has always been interested in the replies given.

"We have the help pick them at such and such a time, so and so many times a day," is the average answer. However, an ingenious plan he ran into some time ago might be of interest to readers. In this particular mill, there was a signal given at regular intervals for picking the top clearers, and the section hands had to see that workers in their charge obeyed the signal.

As much again could be said about the drawing frame but it must be quite patent from the foregoing discussion that the problem of drawing, simple though it appears on the surface, is really one of superlative importance if a good product is desired.

EDITOR'S NOTE—This is the third of a series of articles by Mr. Soniaman. The questions asked are open for discussion in our regular department entitled "How Other Men Manage." All readers are invited to participate. It is not to be expected that all will agree, but it is quite probable that each man will have his *reason why*, and that is what makes it interesting.

The Truscon Laboratories have just issued a valuable book on painting, varnishing, enameling, etc. The book is compiled strictly from the maintenance point of view and is entitled "Truscon Maintenance Data Book." It consists of approximately 100 pages, fully illustrated with maintenance charts, color charts, photographs and other illustrations, and a complete index. Because of the completeness of the book the price is $3.00 per copy.

Keeping Pace With the World.

EDITOR COTTON:

Why is it that some of the men engaged in cotton manufacturing stay so far behind the times? In my daily contacts with them I am becoming more and more to believe this fact. I don't mean that no man in the business is progressive. Cotton manufacturers of the past and present deserve the greatest honors that come to them for their contribution to humanity and society. Nevertheless, some of them are slow to adjust themselves to new conditions brought on by the progress of the world in other lines of activity. The practical man, as he is called, is sometimes so practical that he doesn't have time to look at anything outside of his particular line. He doesn't seem to realize that everything in this world is interrelated with everything else, and that there must be some relationship between cotton manufacturing and other activities.

These men are not altogether to blame for this, it is quite natural. They are, most of them, hard working men, deprived of that privilege of higher education in their younger days which is so essential in the broadening of a man's mind and in increasing his ability to grasp things. They had to work long hours, and sometimes when they cannot get things immediately, they work and work at home for hours, apparently to naught. It is natural, therefore, they don't look into other things that are "a little out of their line." And yet oftentimes one may have a problem of a baffling nature which outside investigation would prove had been solved long ago in some other line. It pays to give a little attention to the outside world, so to speak; to keep pace with world events.

Progress comes from inquiry. Perhaps it is not too much to state that progress begins with a question, so that we may say that to question all facts is to be able to keep pace with the world. It certainly is a good beginning, but that is not the whole of it. We must be able to answer questions. This is the part that necessitates the seeking of information. It is this which takes us out of our own little world and throws us into contact with the larger outside world. In order to travel, one must have a broad mind, in the first place, and then he must be equipped with some of the general fundamentals of knowledge to enable him to understand what it is all about. I think that the important function of a college education is to give a man some of the principles of general knowledge as well as to train his mind. This is rather a material estimation of a college education, but it serves well to illustrate the point.

Thus it is clear that a college man has an advantage over those who work without a good school training; that he is favored from the beginning. Therefore, should we not expect more from the college man along the line of work and accomplishment than from those without his training? I think it is much better for the college-trained man to make use of his training to keep himself fit for his work rather than to talk about how others treat him.

So much for college education. This is my reaction to the various interesting discussions in COTTON on this subject. Turning back now to the question of keeping pace with the world, I should like to present some points where the practical men fall short.

As already pointed out, I find that many of our mill

men are too easily satisfied with conditions. They don't seem to want "to bother." They do not ask. Even some of our leading textile schools are at fault. They give lots of rules to find certain things without giving the reason why. Electrical engineers, mechanical and civil engineers and others, are trained to get the fundamental principles and the methods of solving problems, while textile men are given sets of rules with a few problems already solved. How can initiative be developed by remembering a set of rules?

A thought closely related to this is that in cotton manufacturing, very little use is made of some fundamental principles and simple instruments which are used freely in other branches of engineering. For example, how many textile men use the slide rule? This device is so suitable for textile calculations that it really should be adopted first by textile men. Although the slide rule is based upon the principle of logarithms, no working knowledge of this principle is required to become proficient in its use.

Often men engaged in textile work dislike the word mathematics. It is quite a big word, but in reality it is not so bad as it is sometimes is thought to be. We all do multiplication and addition every day. Well, that is mathematics and nobody thinks it so dreadful. It is true that mathematics consists of more than multiplication and addition, but the principles are the same, and become simple after one grasps them. If a man will learn how to use a slide rule he will save much valuable time, and some of the problems worrying him every day will be as nothing.

H. H. Y. (Mass.)

A Remedy for Uneven Laps.

EDITOR COTTON:

There has been considerable discussions and personal worry over the variation of the finisher laps on the pickers—especially so since no one arrives at any definite conclusions as to the cause of this variation. It's a settled fact that there is none too long, for if the machines are geared the same and the diameters are the same as when the builders sent out the machine, they are mechanically true. Then it must be in the wind-up of the rolls on the front, and the variation is in the short laps.

The calender rolls in front of the screens, and between the two large ones underneath the slip roll pin are positively driven. Then all that must be watched is this slip roll pin which runs under pressure of the head blocks, commonly called logger-heads. All that this slip roll pin has to do is to make the same surface speed as the two large rolls underneath this pin, which is its only contact. The head blocks and their frictional contact must be working well, which is easy to keep up with; that is, the frictional pulleys underneath next to the foot release of the head blocks.

Recently we were troubled quite a bit with heavy laps. We watched them, weighed them, and, as a whole, they weighed as they should, but the sliver was heavy, and when we unwound the laps some were shorter than the rest. We concluded this was due to friction on the rollers in the head blocks and against the slip roll pin, which caused them to not make the same surface speed as the main bottom rollers underneath this slip roll pin, resulting in a crowded appearance of the sheet of cotton in the wind-up of this pin, and making heavy sheets of cotton.

To overcome this evil we decided to put ball bearings on this roller in the head blocks. To do this we had to make rollers and put the ball bearings in them, taking pains to get them true in every respect; this is the back roll or top one in the head block. This diameter must be all that it will stand to make the necessary contact on the slip roll pin, and the slip roll pin must be smooth and true where this contact is made in order to avoid frictional or excess frictional contact. In doing this we found that our short laps were about eliminated. This installation made it possible, or we think so, for the slip roll pin to make the same surface speed as the delivery rolls that deliver the sheet of cotton onto the front for winding-up.

We put two bearings in the blocks; that is, we turned out a roller and took two bearings with about a ¾-inch face, and put a flange between the two bearings in this roller and a flange on the outside to hold it in its place. In the meantime we secured some Alemite oilers and set them in the end of the pins that this bearing runs on. This made it easier to keep it lubricated.

This has almost eliminated our short laps, or the variation in the length of the laps. The ball bearings are the thing. It seems that this takes away the friction on the wind-up and allows the slip roll pins to take it as it gets it; this also makes a firmer lap and the laps are all of the same size and diameter, and we are not bothered hardly any with puffy laps in either dry or wet weather.

T. A. D. (Ga.)

A simple and effective lock to prevent the theft of electric light bulbs, has recently been placed on the market by the Ren Manufacturing Co., 6 Mt. Vernon Street, Winchester, Mass. This device, which is called the Ren-Lock, consists of only a coiled spring and a grooved washer. A special punch is furnished to attach the Ren Lock to the socket.

This device can be used with any standard brass socket but is not intended for porcelain or weather-proof sockets. It can be used with any standard electric light bulb.

When a lamp is locked in by means of this device, it cannot be removed except by breaking the glass. A special bag is provided for this purpose.

Textiles, by William H. Dooley, principal, Textile High School, New York City. (Enlarged edition.) D. C. Heath and Company, 231 West 39th St., New York City.

This volume, recently published, is an enlarged and revised edition of Mr. Dooley's text-book on textiles. The book is written to meet the need of a text adapted to the work of beginners in schools, and including the artistic aspects and distributive methods of textiles. The price of the book is $5.00 per copy.

The Barber Manufacturing Company of Lowell, Mass., spinning tape specialists, who, as recently announced, have opened a southern plant at Charlotte, N. C., now announce that this southern plant is established and producing all kinds of machinery tapes. The manufacturers advise that Barber methods, Barber quality and Barber service now have headquarters in the center of the industrial South whereby they plan to better serve their customers in that section.

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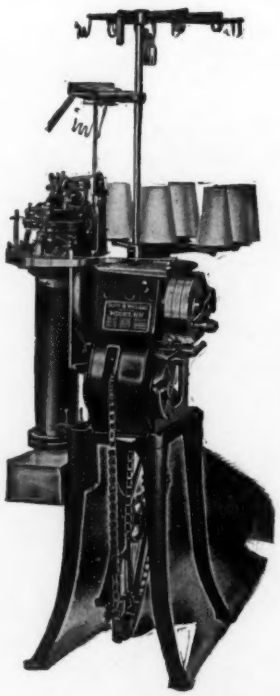

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Problems in Hosiery Manufacture

BY WILLIAM DAVIS, M. A.

A plant of automatic hose machines has a number of problems relating to output with the relevent items of cost finding for this branch of the business and it will be of interest to give examples of the manner in which those factors are derived.

One of the first items to be calculated in starting a new hosiery plant or in extending an existing one is to arrange for the driving of the machines. This is usually done by the introduction of a motor having a power commensurate with the number of machines it is required to drive. These motors are of the usual type, the high speed motors being the most common, with 1,000 to 1,500 revolutions per minute, and the first step is to contrive some means of reducing this so that the line of shaft which has to drive the machines will run at a rate which will suit the speed of all the machines placed upon it. If hosiery machines are the only types of mechanism being driven by motor in the one room, the speed should not be difficult to fix, a very suitable rate for a line shaft for automatic hose machines being 120 revolutions per minute, but larger pulley machines for making circular web and for winding yarn are generally run at a slower speed.

Most types of present-day automatic hose producing machines such as the B5 and K models are best driven from a ground shaft and this presents little difficulty if the room is arranged only for one type of machine. In certain cases it is desirable to drive the machines from overhead, when certain alterations have to be effected in the minor auxiliaries of the drive. The machines being provided with a fork to guide the belt on the pulley for a ground shaft drive, these require to be turned round, or longer guides have to be obtained which will guide the belt on the pulley when it comes from overhead. The overhead drive has an advantage of keeping the floor area clear and rendering getting about more easily, but in practical work the ground drive is preferred, chiefly because of the better grip which the belt has on the pulley. When the drive is from overhead it is found that the belt is frequently coming off the pulley, this tendency increasing with the distance at which the overhead shaft is fixed.

To arrange the motor for a floor shaft, several considerations have to be kept in mind and one is that in general there is a limit to the size of pulley which can be utilized for the driving of those machines. Supports for the floor shafting are in general not more than 12 inches in height so that when the pulley is on, a 23-inch diameter pulley is about the largest which can be accommodated.

In installing the motor one of the first things to be done is to work out the speeds for the countershaft, the function of which is to reduce the revolutions from the motor to the driving shaft of the machines. The motor is generally provided with a pulley about 5 inches in diameter and the pulleys on the countershaft are arranged in the ratio required. The motor pulley drives to the countershaft to a much larger pulley, say 20 inches, and side by side with this is a smaller one which runs its belt to a pulley on to the main shaft which extends across the room and from which all machines are driven. On the one hand we always know the diameter of the pulley on the driving motor and the revolutions per minute are marked on it, at the other end is known the approximate size of the pulley wanted on the main shaft with the speed.

Now the two pulleys on the countershaft can be selected from a range for as long as they bear the same relation to each other and are in the desired ratio they will produce the results. There is one restriction and that is the sizes must conform to what can be accommodated on the shaft, for the large pulley 20 inches diameter should in general be the limit or an unsteady element will be introduced. If we take a motor running at 1,200 revolutions per minute with a pulley of 5 inches diameter and drive on to a 20-inch pulley on the countershaft, this would give $\frac{1,200 \times 5}{20}$ = 300 revolutions of counter shaft. From this we require to turn the main shaft at 120 revolutions per minute; let the second countershaft pulley be 7 inches in diameter, then $\frac{300 \times 7}{120}$ = a 17½-inch pulley for the main shaft. Now the ratio of the two pulleys on the countershaft is always in the following form $\frac{5 \times 1,200}{17½ \times 120} = \frac{20}{7}$ which give the two sizes of the pulleys of the countershaft, but provided that they are within the limits of practibility as regards size, any other two pulleys in the ratio of 20 : 7 would also give the same result.

Let another example be taken where the motor runs at 900 revolutions per minute with a pulley of 6 inches diameter, from which it is desired to give a speed of 100 revolutions per minute to the main shaft carrying a pulley of 18 inches diameter. The ratio just referred to will be given thus: $\frac{900 \times 6}{100 \times 18} = \frac{3}{1}$. The relation of the two pulleys on the countershaft have to be as 3 : 1 and as long as this is maintained, any two sizes will answer, thus 5 and 15, 6 and 18, 7 and 21 and so on, the last two given being generally quite suitable for the purpose.

When the speed of the main shaft has been fixed, it is then a matter of fitting this with pulleys which will cause the machines to run at the regulation speed, remembering that the machines are supplied by the makers with arrangements and pulleys of a standard size so that it is essential to ascertain the speeds at which the machines should run to secure the best practical results. This is a matter of considerable controversy, one school favoring the high pulley speed, while another prefers the slower pulley speed with increased efficiency and less waste. As a rule machines having complicated additions to the usual tackle should be slowed down compared with a plain machine, the "B5" model is generally run between 225 and 250 courses per minute, but the "K" model, which has more complicated tackle added, is usually run 25 courses per minute less.

The speed also depends to some extent on the kind of yarn being worked. If the yarn is strong and firm with

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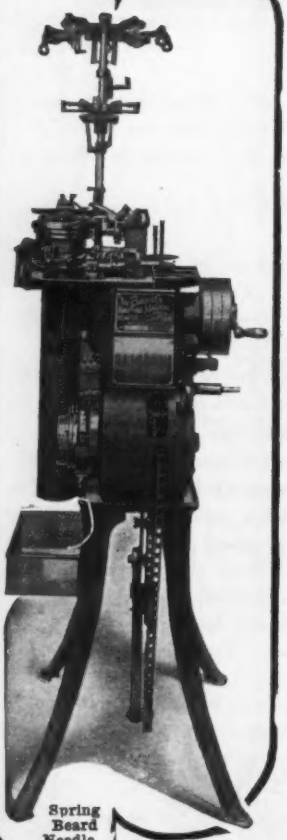

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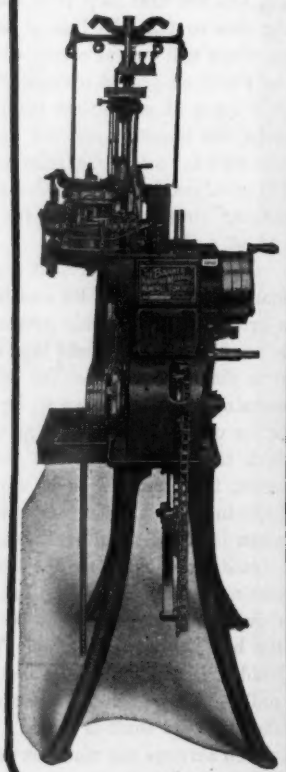

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good body, then the high speed may be maintained without more than the usual waste, but other yarns more tender may require the pulley changed to slow down somewhat to enable the weaker material to work better on the needles. Too much attention cannot be given to the leveling and truing up of those machines, particularly in the finer gauges and a casual walk through hose machine departments often reveals deficiencies in this respect. The machine may be right at the start, with one leg or another packed securely, but after a little this works loose and the machine becomes unstable. Coarse gauge machines may work in this fashion without apparent damage, but fine gauges depend for their successful operation on an absolutely level and firm standing of the machine on its legs. The fine gauge machines are so delicately adjusted that they can only work satisfactorily under a true setting

Many ground shafts develop unsteady working after a short period of operation and the brackets and supports begin to sway and work loosely. This causes friction, but worse still it creates irregularities and unsteadiness in the machines which is at once shown in the character of the work, there being minute deficiencies in loop formation. Reduced output of a machine may also be traced to slipping of the machine belt, when a new one is put on, it slips steadily for some time until it gets its normal length, and after a period of wear it becomes glossy on the inside and fails to grip the surface of the pulleys as formerly. These minor matters are apt to be neglected in large rooms of automatics and they merit the attention of a careful periodic inspection.

The question of the most suitable yarns to select for hose machine gauges is one which is of considerable practical interest, and it is useful for all to have clear ideas of the sizes of yarns which can produce satisfactory work on any given set of needles. The latch needle machine in general can take a wide variety of counts in any one gauge and theoretically we can accommodate yarn counts as wide apart as 10 worsted numbers in the scale.

There are two schools of manufacturers, those who endeavor to produce all kinds of goods on a comparatively small range of machine gauges and those who install the correct machine gauges to suit the class of trade they intend to carry. If, for example, we work a yarn which for normal purposes is admitted to be too fine in counts for any particular gauge, the necessary firmness is obtained by stiffening up the yarn tensions to draw a shorter loop while at the same time inserting an augmented number of courses. Fabrics produced on this principle will have a dull handle, there will be little life about them, nor will they give the required resiliance of texture in wear.

Similarly, an effort to produce heavy weight stuff on a fine set of needles will lead to excessive needle breakage and stodgy fabrics.

In knitting machines the suitable yarn for any given gauge for normal fabric is found to be connected with the square root of the yarn counts, a rule which is well known and widely used as a guide in setting medium woven fabrics.

This rule is not accepted as final by any means and requires to be used with extreme deliberation and judgment but it does serve as a guide to the uninitiated which will prevent any such making serious mistakes in selecting suitable yarns for his range of hose machines. In the hose machine, one factor is rather prominent as compared with flat or straight bar knitting machines and that is they are built in circles and when the knitting process is proceeding there is a strong tendency for the loops to be pulled towards the center of the machine which causes the stitches to close up their spaces and produce a denser fabric.

Herewith is a series of yarn counts for a number of gauges which may be regarded as being normal for these sets or gauges, the figures being taken from a range of standard goods met with in steady demand on the market. The gauge is given as needles per inch on the circumference, the measurement being taken at the point where the stitches are formed, that is the inside of the needle hook. The numbers of counts given are in worsted system for convenience, that is the number multiplied by the standard hank 560 will give the number of yards per pound.

Gauge in Needles per Inch.	Yarn Suitable. (Worsted Counts)
6 n.p.i.	4s worsted
8 n.p.i.	7s worsted
9 n.p.i.	9s worsted
11 n.p.i.	12s worsted
13 n.p.i.	16s worsted
14 n.p.i.	20s worsted
17 n.p.i.	24s worsted
22 n.p.i.	30 worsted

This table is shown at Fig. 1 plotted as a graph where it will be noted that the values of the needles per inch are

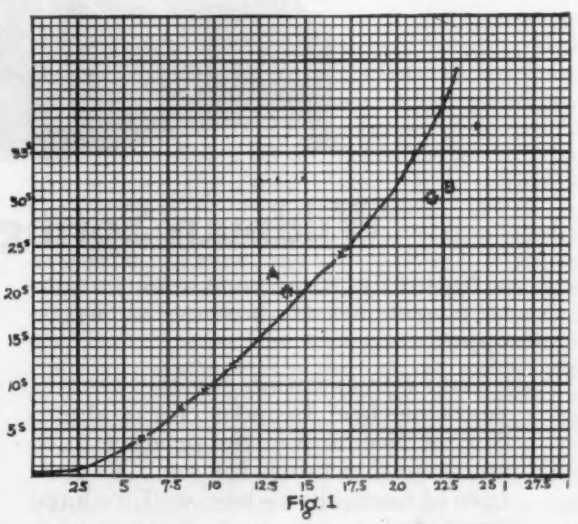
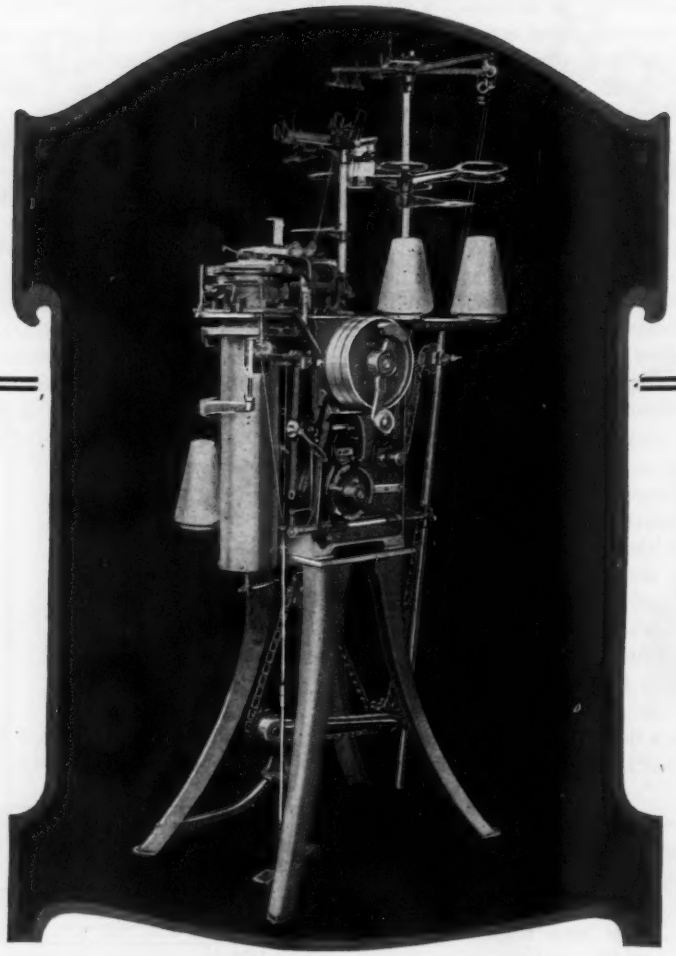


Fig. 1

marked crosswise, while the counts of yarn numbers are given up the left side. The general form in the graph is curved except at two points A and B which lie on either side of the line out of the regular form. The yarns in most types of knitting machines show a form of this character when marked out and in referring to the table it will be noted that the worsted yarn number is lower than the needles per inch at the start, at 9 needles per inch the suitable yarn is 9s worsted, which places them level. Towards the higher numbers such as 14, 17, etc., the yarn count is noted to run rapidly away from the number of needles per inch. These values and the form of the curve which they produce comes very near that of the following: $N = 3.2 \sqrt{\text{worsted counts}}$. This is easy to remember and



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the curve can be produced at any time so that a suitable yarn for any set of machine can be pointed out with a sufficiently close approximation. The principle of the square root of the yarn counts is, of course, based on the assumption that yarns are cylinders and that, therefore, they are proportional to the square roots of their diameters. The figure 3.2 is a constant which may vary according to the class of trade done by the firm under consideration, but another line of hose, say light-weight summer goods, might find that the counts produced by this formula is too low and the multiple could be increased, say to 3.25 or 3.50, according to practical tests so as to give yarn sizes which were thinner than those obtainable by the above figure. In the same way a constant of 2.75 or 3 would produce a range of counts slightly heavier than those outlined and as has been noted in Fig. 1 we may have a sudden changeover from one line to another.

This principle can be made the foundation of a number of useful calculations relating to hosiery and a few examples will be given:

Example 1. Using the particulars given, find a suitable worsted counts of yarn for a machine with 15 needles per inch.

$N = 3.2 \sqrt{\text{counts}}$.

$15 = 3.2 \sqrt{\text{counts}}$. $15 \div 3.2 = \sqrt{\text{counts}} = 4.7$

Therefore, $4.7 \times 4.7 = 22$s counts.

Example 2. Find a suitable counts for a set of 20 needles per inch.

$N = 3.2 \sqrt{\text{counts}}$.

$20 = 3.2 \sqrt{\text{counts}}$. $20 \div 3.2 = \sqrt{\text{counts}} = 6.25$

Therefore, $6.25 \times 6.25 = 39$s worsted counts.

Example 3. Find a suitable yarn counts for a set of needles, 7 per inch.

$N = 3.2 \sqrt{\text{counts}}$. $7 \div 3.2 = \sqrt{\text{counts}} = 2.2$.

Therefore, $2.2 \times 2.2 = 4.8$ worsted counts.

Example 4. Calculate a suitable set of needles per inch for a yarn equal to 10s worsted counts.

$N = 3.2 \sqrt{\text{counts}} = 3.2 \times 3.16 = 10$ needles per inch.

Example 5. Find a suitable set of machine for a yarn equal to 36s worsted counts.

$N = 3.2 \sqrt{36} = 3.2 \times 6 = 19.2$ needles per inch.

Example 6. Find a suitable set of needles per inch to accommodate a yarn equal to 18s worsted.

$N = 3.2 \sqrt{18} = 3.2 \times 4.24 = 13.6$ needles per inch.

Example 7. If an 18s worsted yarn is suitably set in 13.6 needles per inch, find the setting of a 10s worsted counts to give a fabric similar in every respect in regard to texture.

In changing from one texture to another, we can dispense with the constant 3.2 and simply deal with the square roots of the yarn counts. In this problem, the answer will give a smaller number of needles per inch, as the thread is thicker, but this reduction will take place according to the square roots of the two counts given.

$$\sqrt{18} : \sqrt{10} :: 13.6 : \times$$

If we do not have tables of square root numbers handy, the easiest way is to square the whole expression and extract the square root of the answer thus:

$$X = \frac{10 \times 13.6 \times 13.6}{18} = \sqrt{102} = 10.1 \text{ needles per inch.}$$

Example 8. If 18s worsted counts is worked in a machine having 13.6 needles per inch, find the counts to use in a machine with 7 needles per inch to maintain the same features of texture.

13.6 : 7 :: $\sqrt{18}$: squaring the whole expression:

$\frac{7 \times 7 \times 18}{13.6 \times 13.6} = 4.8$ is the square root of the counts so that $4.8 \times 4.8 = 23$s counts.

Of course when all these factors are set out on a graph and enlarged suitably so that the items can be read off to a sufficiently small fraction to insure accuracy, these problems can all be solved at a glance by referring to the appropriate part of the graph and when such calculations have to be worked with frequency, this saves a considerable amount of time. These answers are given in worsted counts but the numbers can readily be converted to other bases by the usual methods.

Uneven Dyeing of Artificial Silk.

The same batch of artificial silk frequently shows two shades after dyeing with the direct cotton or sulphur colors. This problem has been the subject of much careful investigation, but up to the present time no dyeing method has been found which will give uniform results. As the dyer is often blamed for the appearance of the dyed material it is well to give the subject more careful consideration before drawing a hasty conclusion.

Actual unevenness of dyeing is readily recognized by the irregular clouds and streaks of dark and light color. The unevenness is generally found to be level in units, while the units (skeins, cones, hosiery, etc.) vary from uniform light shades to uniform dark shades. Sometimes in the same skein it may be found that the shade changes abruptly from light to dark or *vice versa*. A knot will be found at the exact point where the change occurs showing that a different lot of yarn had been tied in. In hosiery, as well as woven piece goods, distinct bands may be found wherever a new cone or bobbin has been put on.

In every case of complaint the lot must be examined carefully as it is almost sure to yield evidence of this sort which will exhonorate the dyer. The manufacturer of the artificial silk, whether viscose or chardonnet, understands this condition, but so far has not been able to correct it. While the theoretical fiber is pure cellulose, corresponding to bleached cotton, there inevitably forms a quantity of hydrocellulose, corresponding to mercerized cotton, which, of course, has different affinities for dyestuffs.

The physical appearance of the different lots is identical, but as the conditions of manufacture vary in some slight detail from day to day, the differences show up strongly in the dyed and finished product.

There is a reagent, used in microscopic work on paper fibers, consisting of iodine dissolved in zinc chloride solution which gives a stain varying in blueness from a red on pure cellulose to a deep indigo on hydrocellulose. This can be used to show the degree of mercerization of cotton, and will also show the degree of hydrolization of art silk. It might be used to advantage by the manufacturers to standardize this product.—*American Dyestuff Reporter.*

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Plaiting Art Silk on Cotton.

EDITOR COTTON:

My particular pet problem right now is that we have just gone onto plaited work, and, if you'll excuse the expression, I'm having a hell of a time, as everybody on this kind of work knows.

We are plaiting a 150 denier artificial silk on a 70s mercerized cotton, making a men's half-hose on "Banner" machines. If the silk yarn feeds in jerks, or the tension is uneven, the result is mis-plaiting. I should appreciate having someone with experience on this work describe any tension device they have adopted that gives the silk an even tension at all times when necessary. We have tried several, but should like to know what other people's experience is.

This business of plaiting is a problem in more ways than one. If some of your readers who have conquered it more or less, would sit down and write us some general pointers on the subject, I know others, as well as myself, would read them with interest. R. L. M. (Tenn.)

Eliminating Streaks in Silk Hose.

EDITOR COTTON:

We have been making a silk half-hose out of a 12-strand Japanese silk yarn, plaited in the double sole with mercerized yarn. A recent difficulty is that throughout the length of the leg of the hose, streaks showed up that seem to indicate an uneven tension on the yarn. In making some investigations about this, we have found that sometimes this yarn has too much gum in it, and at any rate it will dry out, especially after it gets down nearly off the cone. This causes the yarn to not cling to the regular "drag" tension on the machine and it goes into the cylinder with a jerky motion, which we believe has been causing these streaks.

I have rigged up an additional tension device which is fastened to one of the other arms of the bobbin stand. This I made by placing two discs on a round iron pin, being held against each other by a loose coil spring. As the yarn passes between these discs it gets a sort of compensatory tension which lets it feed in a regular, smooth way without any of the jerks. The yarn passes through this and also around the regular tension.

This has about eliminated these streaks, and I find that it is an advantage in making the double sole. At this point, especially, the yarn should feed in as steadily as possible, as when it slips along in jerks the double sole of mercerized is liable to come out on top of the silk yarn. The extra tension has about eliminated all of this for us also..

E. T. (Ga.)

A Tension Device for Plaited Work.

EDITOR COTTON:

When a mill goes onto plaited work, the knitting superintendent immediately discovers difficulties he never thought existed. This style of hosiery, in its present popularity with the wearer, is being made by an increasing number of mills, and there is much to be worked out about it before perfection comes ultimately in its manufacture.

One of the important features in making a hose with artificial silk plaited onto mercerized cotton is the necessity of an even, regular tension on the plaiting yarn. My experience has been that the ordinary barrel-type tension will not give this, and furthermore, with this type of tension, a knot will cause the yarn to break. Neither am I satisfied with the compensating type of tension, as I have never been able to successfully adjust this.

I have been experimenting and have developed a tension that is working very satisfactorily for me on Banner machines. It is shown in the accompanying sketch. You will observe that it is similar somewhat to the Scott & Williams disc tension, except I have made the following features which I believe to be an improvement for this class of work:

In the first place, I use no weight or spring tension on the two discs. They are fitted loosely on the vertical post which is secured to the horizontal side of the angle strip. The yarn comes through the porcelain eyelet *A* and passes between the two discs on through the other eyelet into the machine. My theory is that it is an advantage to have the discs revolve, as this allows all accumulated lint, etc., to pass out from between the discs. You will observe, how-

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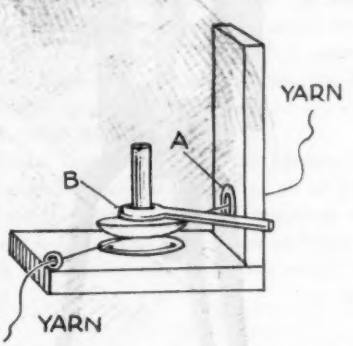
LATCH NEEDLES

ever, that I have added the piece *B*, which slips on over the discs. This is adopted in order to prevent the discs from revolving too rapidly. As the yarn turns the top disc around this takes *B* around until the tail strikes the upright side of the angle strip and this puts a sort of "drag" on the disc and does not allow it to move around so rapidly as would be the case without it.

This device of course would have to be altered some-



what to suit local conditions of machines, etc., but I pass the principle along for the consideration of any who may be interested in such a proposition. It is simple to make and gives no trouble.

Should anyone else have a tension that is doing this work satisfactorily I should be glad to hear of it through "Knitting Kinks." J. K. L. (Tenn.)

Testing for Chlorine in Underwear Bleaching.

EDITOR COTTON:

We have for a number of years made men's knit underwear, and use about the usual machinery in our bleaching, using a chlorine gas in our bleach, with the usual sulphuric bath and water wash afterward.

Some time ago we had a complaint from one of our regular customers, who said that after the goods had been shipped to them and opened there, yellow spots showed up on the garments. They suggested that either we weren't getting all the chlorine out, or else oil was getting on the goods.

Being friendly with this customer, we had them send us back a box of garments, and when we opened it, sure enough, the yellow spots were there. We were certain it wasn't oil, for we have a very rigid system of inspection, and this would have been detected, and we had not been having any seconds due to oil. It then, perhaps, was the chlorine.

We have no regular time for washing the goods. We put in 1,800 yards of tubing—18 one-hundred-yard rolls—and had been accustomed to running it until by smelling of the goods it seemed all the chlorine was gone. In fact, when the goods left our plant, they showed up all right, but it seemed that after packing them in the boxes, out of the air, the chlorine spots would come back.

In endeavoring to get rid of this, we took the matter up with several chemists, and finally the people from whom we buy our chlorine suggested a way out. They told us to get some pottassium iodide, and mix about an ounce of it in a pint of water, putting it in an ordinary hair-tonic bottle of the "shaker" type such as a barber uses. This we did, and the use of this test has solved the problem for us. What we do is to sprinkle some of this on the goods, while in the wash, after they have run awhile. If the spot on which the potassium is applied remains white, we know all the chlorine has been washed out. If it turns yellow, that indicates the presence of chlorine and we continue washing until it can stand the test by remaining white. We use this to determine if a complete run is finished, or to ascertain whether the goods in any particular part of the tank are thoroughly washed out.

This is a simple test, but we have found it invaluable, and pass it along to any other men who may have a use for it. Likewise, we should like to read about any kinks that the other fellows have discovered. O. R. N. (Tenn.)

Loading Up and Making Drop Stitches at the Transfer.

EDITOR COTTON:

I notice the question of the reader who is having trouble with the H-H machine loading up and making drop stitches at the transfer. Here are some suggestions for him:

See that the jacks are coming out right between the needles. The needles must be centered. Perhaps the dial is too high. See that the dial is set in the proper position and that the cast-off is coming out in the proper position. I presume he has been instructed as to this. Possibly the saw-tooth sinker isn't pushing the work away from the needles. Maybe he needs a little more friction on the cam that operates the saw-tooth sinker. A. P. (Ga.)

EDITOR COTTON:

In reply to the question from your subscriber who is having trouble with the H-H machine loading up and making drop stitches at the transfer.

It is rather difficult to answer the questions he asks, as there are so many adjustments on the H-H machine that will assist the fixers for getting better transfers.

With reference to what he calls "gauge" in the latch of the dial needle, he evidently thinks the dial needle hook is too small. This is a natural conclusion for an average knitter to reach, due to the fact that he has heretofore been accustomed to a needle with a latch and when the latch is closed the area between the latch and the needle is a fixed one; therefore, larger hooks are required for coarser gauges. With a latchless needle there are no latches to close on the hook, thus making a limited area. On the other hand, the hook remains open and the yarn is being drawn over the open part which has no limit for the yarn that can be drawn over it. The cast-off goes into action after the stitch has been formed and in consequence does not interfere with the apparent over-size yarn in the small hook.

Regarding this man's trouble with drop-stitches, will say I have found that drop-stitching on H-H machines is primarily due to the lack of sufficient slack course made just prior to the point of transfer. There is a special slack course sinker cam mounted in the sinker ring for the adjustment of the length of the slack course. This cam naturally wears by constant use and an adjustment must be made to take up this wear as it occurs, for which there is a small eccentric mounted on the cam to permit of its being set in to a greater distance.

I hope the foregoing will aid your correspondent, and

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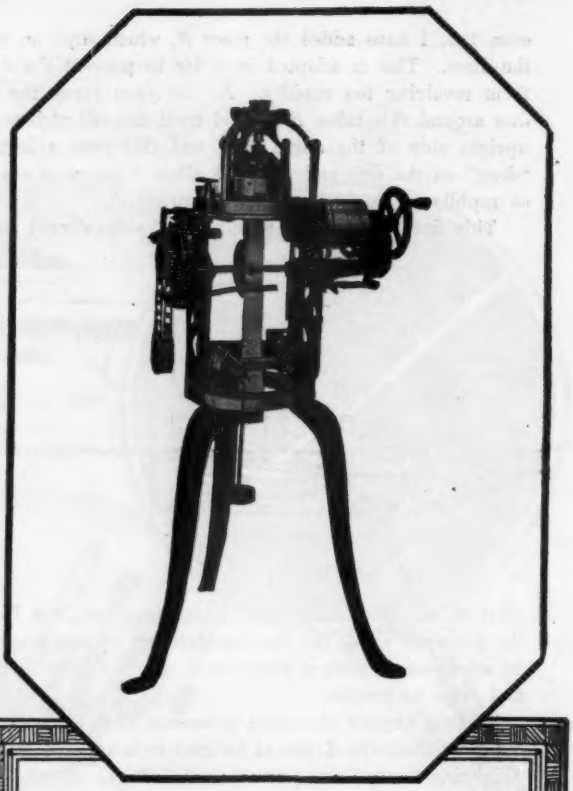

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should be interested to see the opinions of other men who have had experience with these machines.

N. M. (N. Y.)

Making "Loop Knit" Cloth.

EDITOR COTTON:

I note the inquiry of "M. E. W." in June "Knitting Kinks" for a knitted loop cloth. As stated in a reply published in the July number, one kind is manufactured by the Putnam Knitting Company, Cohoes, N. Y., who own patents on the machine and fabric, and the fabric may be purchased from them.

The Elasto Textile Company, the Electric Knitting Co., and the Laughlin Manufacturing Co., all of Cohoes, N. Y., also produce this type of cloth on machines manufactured by Stafford & Holt, who are located at Little Falls, N. Y.

I think any one of these concerns would sell the cloth in the roll.

A. Y. (N. Y.)

Losing Hosiery Profits and a Dyeing Problem.

EDITOR COTTON:

I am taking this occasion to bring up for discussion in "Knitting Kinks" some points involved in making ladies' hosiery. You will note I have chosen subjects that will stand plenty of discussion, and some argument. I believe we all will benefit by expressing our ideas on these, and I therefore hope we shall hear from some other men making this stocking, giving their ideas on these points.

First, does anyone know of a satisfactory way for keeping ladies' hose on size, that is, keeping the lengths standard? We are running silk goods, and if a man is paying us for a 19-inch stocking, and we are giving him 20 inches, we're losing a big hunk of what should be our profit. If we give him 18 inches, we hear from him right away, quick. We have tried to find a tension to put on that will take up the difference when the yarn runs light or comes off the cone easy. Adjustments on the cylinders for tightening and loosening the stitch can affect this; the looser the stitch the longer the stocking. Who knows how to overcome this cause of lost profit?

Many mills are going into union-dyeing—silk, and artificial silk, and cotton, in several combinations. In making a three-fiber stocking, as an example, what sort of dye is best to use? Is it best to use the uniform dyes? At what temperature is it entered, and how long is it run?

Finally, which do your readers think is best to use for dyeing: the paddle machine or the rotary machine? Now, when I say I prefer the paddle machine, I realize I'm bucking a lot of experts, but I do, just the same. I should especially like to hear from the advocates of the rotary machine, and from those who, like myself, prefer the paddle type. The biggest argument advanced for the rotary type is that it isn't necessary to pack the goods, but it has been my experience that we cannot add additional dyestuffs to the bath, while with the paddle type we can add it four or five times, easily, and there is a point in regard to production—you can get so much more off with the paddle type.

Furthermore, the question of artificial silk comes up again here. When artificial silk is damp, it becomes just like tissue paper. It tangles up and tears up, when handled. While in the paddle machine it is handled without damage from this standpoint.

In conclusion, will the rotary-machine advocates explain how it is possible to get a rotary machine to heat evenly at both ends of the machine? I can't do it.

M. P. R. (Tenn.)

A Question on Underwear Defects.

EDITOR COTTON:

The fact that there are so many more hosiery mills than underwear mills doubtless will cause most of the letters to "Knitting Kinks" to concern hosiery. But we men running underwear mills have our problems, and also should take advantage of this opportunity to discuss them, and it is very good of you to allow us space in the department as well as to our friends making protective and ornamental wear for the nether limbs.

The question upon which I should like to see some discussion from underwear men right now is this: What method do you use for checking up on needle lines, and other bad work in the knitted fabric? Who does this, and what sort of system and inspection is carried out? What is classed as a defect? When defects are found, what system is used in deducting therefor from the operator's wages?

This proposition is of interest to all underwear mills, and I should like to have some of the men tell us, through "Knitting Kinks," just what method they use.

H. G. (Tenn.)

Kinks to Prevent Silk Yarn Breakage.

EDITOR COTTON:

The knitting mill man who runs silk knows the invariable difficulty of broken yarn. The silk, being gummed, is very brittle, and when the necessary knots are tied, the ends form a large knot. When winding off on the knitting machine, the thread, if it hangs on one of these knots, invariably will break, causing waste and loss of time.

We were having lots of trouble with this recently and I sent one of our men to visit some other mills, and he came back with a "kink" that practically has eliminated this problem. Now, this may be very familiar to many men who have run silk for years, but I feel that if it helps even a few men who have this trouble, it will make very much worth while my writing this letter and your publishing it. Here is what we did:

About four inches above the top of the cone, we fastened an ordinary piece of tin to the bobbin stand rod, by bending it around the rod and fastening it with a bolt and nut. This strip of tin is about ¼ inch wide and about five inches long. The material we used was some old ties we had used for export packing. Then we bent the strip so that its flat surface was horizontal, and the outer end extended out over the cone. Near the end we cut a small round hole so that it was directly above the center of the cone. The yarn is brought from the cone, up through this hole, and then threaded up in the usual way.

The result is that now the yarn in winding off the cone and passing through this hole gives a sort of balloon to it,

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so that in winding off it is thrown away from the surface of the cone and does not encounter the knots.

Another thing we did for this same purpose of reducing the breakages in silk yarn was to set all the cones in a pasteboard receptacle partly filled with common rice. Sometimes on the bottom of a cone the silk will slip out of line and cause a tension as it is unwound. This seat of rice constantly keeps the yarn worked into the proper position, and we scarcely have any breakages from this cause now.

I commend you on starting "Knitting Kinks." More power to it. It is just what we knitting mill men need. Now that I have contributed the foregoing kinks, for whatever they may be worth, I am expecting somebody else to come across with something he has done.

J. J. P. (Ga.)

A One Day Routing System.

EDITOR COTTON:

I want to describe for your "Knitting Kinks" section our system for getting the goods to move faster through the mill. At one time we used to have the knitter, at the end of the day, tie all work in one bundle. This would make a large bundle, as some knitters would have fifteen or twenty dozen for a day's work, and that made some bundle for a looper to handle.

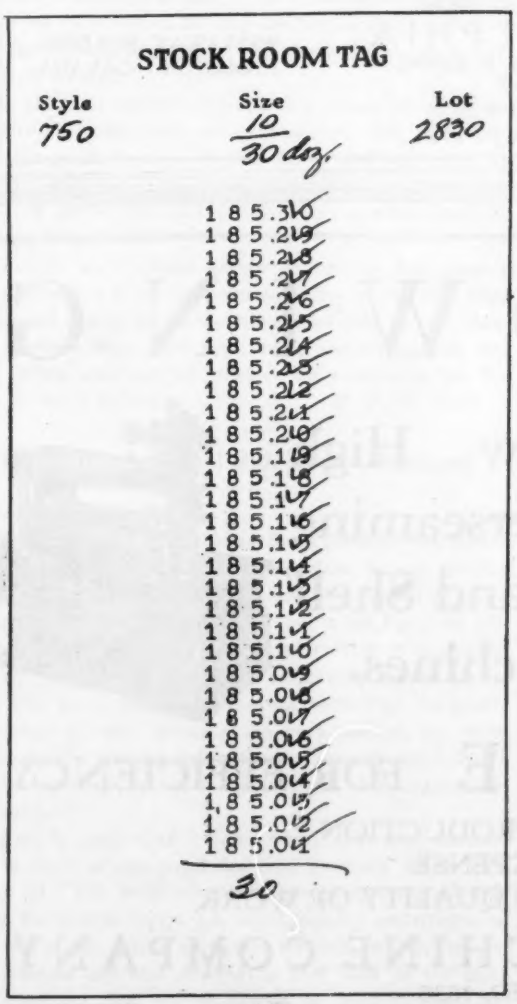

Fig. 2

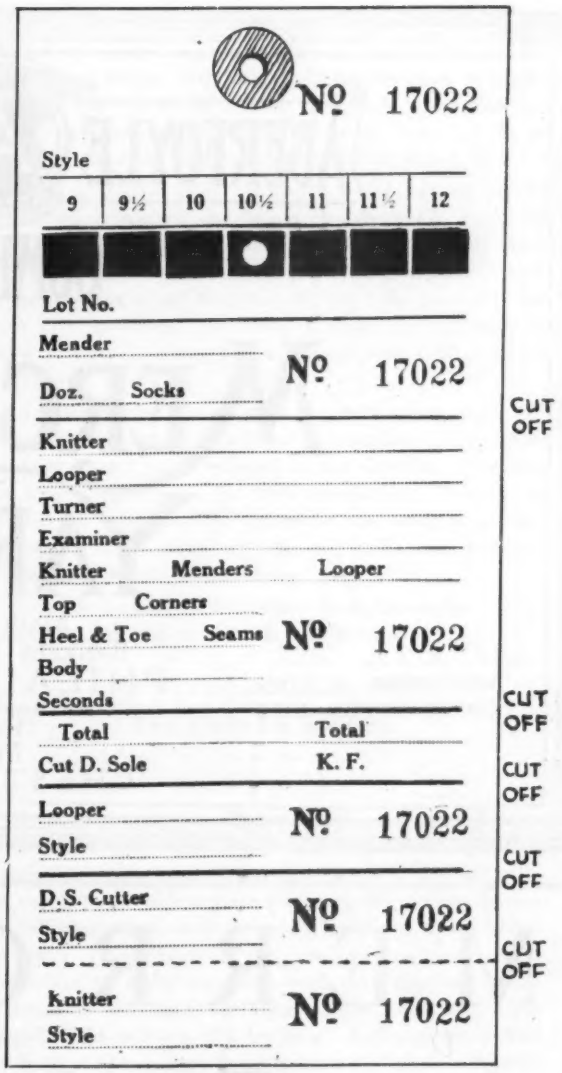

Fig. 1

This system worked out for a while and then we adopted another one which we called the ten-dozen system, which we used for about twelve years. When a knitter had finished ten dozen she would tie them up and put her tag on them with her name on it. Each tag carried a number and the style, and this she would put on her work, and the number and style on the time card.

Then we had a man go through the mill four times a day to get the work, check off the bundles for each knitter and looper and examiner, and after each was finished this work went into a bin, each style and size to a bin, to get ready for dyeing, and then each day the man would get the dyehouse order. Another man would sort the work and get it ready for dyeing. This system kept two men busy all day long and we wanted to try something else that would get the work to the dyehouse and finished more quickly.

Now we have what we call a one-day system. This is

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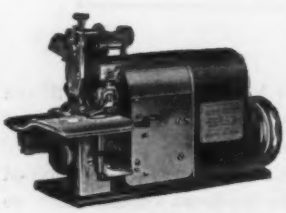

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the best of all. The knitting room foreman gets all the orders to be knit, on cards as shown in Figure 1. This tag must go with the goods when the knitters have finished. Each morning these tags are given to the knitter, and for each dozen that she knits, she tears off the bottom stub, which she retains and turns in at the end of the day, or when she is finished. A record of her time is kept something like this:

Date	Name	Style	Size	Tag Number
9/11	Helen Ecks	750	10	15 (18530 to 18545)

As the operator in each department finishes the goods the tag is torn off and turned in and this record is kept until the goods have gone all the way through.

If, for some reason, a knitter is sick or stays out, the tag comes back again and is given to the next knitter on the same size, and the number goes to her name.

Also I am sending a tag that goes to the man in the stockroom, shown as Figure 2. Each time that an order is given on the knitting floor the man in the stock room receives a card with the tag numbers upon it. These are the numbers of the several tags the knitter puts on the work. They are printed on the stockroom card by running the card through the adding machine in the office. If the stock room man reports that he can't find number so-and-so, all that we do is look to see if it has been knitted, and if so, go to the looping department and chase it up. In a short time it is located.

We make six styles and work this system on all styles. I believe it is the best system that any mill can adopt to get the goods through the mill faster and keep right up with the shipping. The production manager knows just how much goods is in the mill and knows where each lot is at any time.

We built an overhead carrier system so that when a knitter finishes a dozen it is carried to the looper, and when it is looped it goes to the examiner, and then to the stockroom where a man sorts them as to the lot number and style. When they are all finished, the stock man has the goods all ready to dye. H. D. G. (Pa.)

Protect the Artificial Silk From Moisture.

EDITOR COTTON:

I would advise the gentleman from Georgia, who states in "Knitting Kinks" that on damp days he has trouble with his 150 denier artificial silk and one strand of pure silk, as the artificial silk will stick out while the pure silk will remain in the proper position, that it is positively necessary to oil the artificial silk in making up the stockings. This point has been definitely settled in the trade. The proper oil will lubricate the yarn and at the same time is readily washed out with soap or any mild alkali after the stockings are made up so it will cause no trouble to the dyer.

The oil is applied in various ways. The best manner being to make a zinc lined box and partially fill it with straight oil. The artificial silk is opened up and allowed to soak for several hours. A small laundry centrifugal is placed on a zinc apron alongside the tub and the excess oil is whizzed out and allowed to flow back in the box. It is important that the oil should be used straight, as any moisture from the air or from water will cause the silk first to stretch and then to shrink when dried out, causing all sorts of trouble. Water cannot pass through oil, a fact which is well known to long-distance swimmers who coat their bodies with oil, and, furthermore, a duck's feathers are full of oil and he never gets wet. You can readily see that after soaking in the oil there will be no moisture absorbed by the artificial silk on damp days.

This, of course, does not apply to the finished article, as the oil is washed out before the goods are dyed. If your correspondent wishes the goods to be absolutely moisture-proof after being finished he could give them a bath of soluble wax or an emulsion oil, but I do not really believe this necessary. However, I would be interested to know whether he refers to the finished article lying on the shelf.

Another method is to open the yarn on a cross "T" and spray the yarn with a large tin atomizer. Others pass the yarn over a roller attached to the machine. However, the first method gives the best satisfaction. The oil, as pointed out before, should always be used straight without any water as the water will dry out and cause shrinking in the artificial silk at the wrong time.

I should be glad to have other problems of this nature submitted, and will do what I can to help.

J. A. B. (Pa.)

Two Kinks for Knitters.

EDITOR COTTON:

As I understand the purpose of your discussion department on knitting, your idea is not to publish only those brand-new, revolutionary ideas that no one is familiar with, but rather to provide a place where we fellows can discuss and tell about those more commonplace things in and about the plant. I have no doubt that much of what you publish is familiar to many men who read the department; but at the same time there are always those whom the "little things" might pull out of a big hole. And anyhow, it does not do us old-timers any harm to have our minds refreshed on the seemingly unimportant points every now and then.

With that understanding, I will tell something about two "kinks" that have been of material assistance to us.

Some time ago we were making a ladies' wool stocking, plaited with mercerized. You know that the wool yarn was weak, and we had considerable trouble with it breaking. After experimenting quite a bit we found that by pouring a little gasoline on the top of the cone of wool yarn, we eliminated a large percentage of this breakage. We poured the gasoline out of a tin cup and it immediately saturated the entire cone. Maybe this'll help somebody.

There is another thing we are doing which I understand is being rather commonly adopted. It's a good thing. In making a double-sole ladies' hose, it is impossible to prevent the double sole from scattering, due to various causes, and with white yarn, this is difficult to detect at the machine. We, therefore, have secured a tinted yarn which is used on the double sole, and the contrast makes it a very easy matter to ascertain when the scattering occurs so that the cause may be eliminated promptly. Most yarn mills make this tinted yarn, and the dye used is so fugitive that it will come out when the stocking is dipped in cold water.

T. D. S. (Ga.)

The Yarn Market

An anticipated upswing, coming rather suddenly, and persisting during the latter part of July, altered conditions in the Philadelphia yarn market considerably for the month past as it is reported here. Fundamental changes were observed as a result that present a new aspect in the trade.

For some months business has been at a comparative standstill, with the consuming end applying for yarns only to cover business coming to them, a policy of "hand-to-mouth" purchasing, and the selling and manufacturing end of the yarn trade has been more on the defensive, with individual instances of noticeable price shading to induce orders that hung hesitant both as to being placed and the location to be placed.

A rally from the spinners boosted prices with an increase unprecedented since the boom periods of the war. While conditions in August indicated that the entire effect of this bull action had not been able to persist, at the same time it was felt that fundamentally, from the spinners' standpoint, the market still remained much healthier than during the period preceding the elevation in rates.

This was assisted and borne out by the underlying conditions that have accumulated in the spinning end, and in this connection it seemed apparent that very few large stocks of yarns remained in the hands of the makers, it having been disposed of through individual channels of sales, or avoided through discretionary curtailment at the right time.

It was felt that a definite improvement would result with this condition accompanying the rest, when prices advance, though temporarily insofar as the whole of the rise is concerned. It is added that the consuming end also are not over-stocked with goods and the feeling is that the combined situation is one working to the betterment of conditions in the market.

One feature of the merchandising phase of the market developing during the month was that it seemed, whereas previously a "hand-to-mouth" business was offered by consumers, and whereas business in the market seemed most uninteresting to yarn users, during August it was felt consumers were coming to market in larger numbers. This revival of interest might be attributed to a better tone throughout the industrial and commercial world generally, for the greater part, and to anxiety and curiosity on the part of users as to the result of these signs of improvement upon yarns.

On the other hand, however, there were few reports of much improved business resulting from the consumer's return from apathy to interest. This time it seemed they found the price level higher than had been anticipated, and out of possible conformity to their own efforts to produce at a profit; while spinners continued their contentions that even at the higher elevation established, the quotations on yarns still afforded them nothing to deliver to the stockholders on their investments.

So, while selling continued about the same, the changed condition is expected to be of good omen for the future, and better conditions are anticipated soon, the market to go forward on a more definitely settled foundation.

It seems at the writing to be a seller's market now. In the South "continued curtailment and a firm stand and patience" is counseled to put the market on a profitable basis for the spinner and to defeat short selling and speculative manipulations in yarns.

Following are quotations on the Philadelphia market on August 15:

Single Skeins.

4s to 8s	43	10s	43
12s	43½	14s	44
16s	44½	20s	45½
24s	46½	26s	47½
30s	48½		

Single Warps.

8s	43	10s	43½
12s	44	14s	44½
16s	45	20s	45½
26s	48	30s	49½
40s	57		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slacks	42½
8 3-4 hard white warp twist	40½
8s and 9s 3-4 tinged tubes	38½
8s 3-4 hard twist waste	37½

Two-Ply Skeins.

8s	42½	10s	43
12s	43½	14s	44
16s	45	20s	45½
24s	47	26s	48
30s	49	40s	56½

Two-Ply Warps.

8s	44	10s	44½
12s	45	24s	47
14s	45½	16s	46
20s	46	26s	49
30s	50	40s	57

Frame Spun Carded Yarn on Cones.

8s	42	10s	42½
12s	43	14s	43½
16s	44	18s	44½
20s	45	22s	45½
26s	46	26s	47
30s	48	40s	56
30s double carded			51
30stying-in			47½

Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	61	20s	63
24s	65	30s	67½
40s	72½	50s	75 @77½
60s	80 @82½	70s	92
80s	95 @$1.00		

Mule Spun Carded Yarn on Cones.

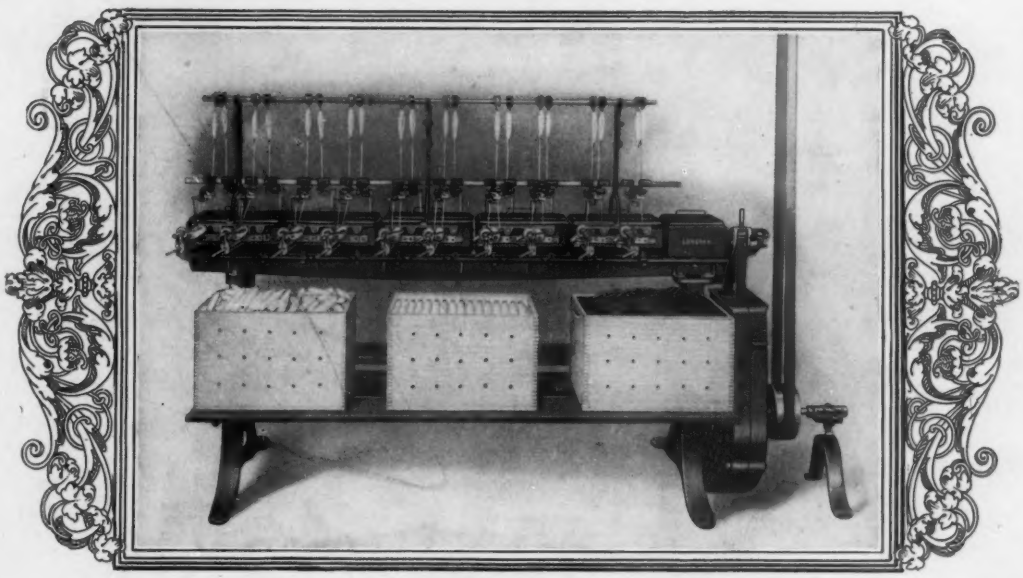
10s	46	12s	47
14s	48	16s	48½
18s	49	20s	50
24s	52	26s	54
30s	57	40s	64

Mule Spun Combed Peeler Yarn on Cones.

10s	52	12s	53
14s	54	16s	55
18s	56	20s	57
22s	58	26s	62
28s	63	30s	64
36s	67	38s	70
40s	72		

The American Cellulose & Chemical Manufacturing Co., artificial silk manufacturers, located at (Amcelle) Cumberland, Md., has awarded the contract for its acetone manufacturing building, with delivery in eight weeks. C. F. Beran is chief engineer. Including this additional unit the new plant is comprised of a textile factory, a spinning building, winding and warping building, workshop and stores building; also a cotton storage and treatment building; an oil extracting plant; a silk research laboratory and a water softening and filtration plant. The Austin Company, Philadelphia, are the engineers and builders for this project. Construction of this plant was started in January. At present all the buildings are completed with the exception of the acetone manufacturing building.

Circular No. 167 of the Bureau of Standards, Department of Commerce, Washington, D. C., which has just been issued, outlines the U. S. government master specifications for tent duck (special construction for bleaching or dyeing), grey. Copies may be procured at the Government Printing Office, Washington, D. C., at five cents each.



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The Knit Goods Market

The knit goods markets showed some improvement in August, in a somewhat increased volume of business in hosiery, underwear and sweaters. But prices continued out of line with cost of raw materials and it was apparent that in some lines profits were being sacrificed by manufacturers, while jobbers and retailers, taking advantage of low prices at mills, were able to fare very well in the matter of margin on turnover.

There was not sufficient demand for hosiery, even on increased buying, to stiffen manufacturers' prices, and in some instances quotations took a downward course, which had the effect of disturbance to others. Heavy weight cotton ribbed underwear, on the other hand, was bought more freely on reductions, in which southern mills had led more than a month before. As to underwear, however, prices remained steady after the revisions had been announced, due in some measure to the fact few of the northern manufacturers followed the course of those in the South.

The situation in knitted goods was not different from that for most other manufactured commodities. Buyers, as becomes professionals in their endeavor to obtain goods at the lowest possible cost, visioned many things which could be used as a pretext for restricted operation. They stressed what they were prone to term the uncertain outcome of the political situation; they noted in banking and commercial reports an expressed tendency toward lessened buying power on more unemployment as a sequence of mills giving employees longer than the usual vacations and continued reduction in wages—more closing down by factories than resumption by those which had been idle, all of which was construed as heralding lower prices eventually, and encouraging to retailers determined to restrict their advance orders to the danger level.

Price is the big question. While a nationally known statistician and forecaster takes the stand prices will be higher in the next few months, and eventually start on a decline that will not end until more nearly equitable relations have been established as between the primary and consuming markets, some important industrial heads say advances will not materialize this year; that they will be checked by competition, which in itself will force greater economies in production and distribution as all hands gradually divorce themselves, under pressure or otherwise, from the extravagant habits acquired when the going was easy and profits large. It seems evident, in the low levels established in mills, that many manufacturers already have driven the entering wedge for more economic practices. For the same reason they have done so, distributors—jobbers and retailers—eventually will be wielding the sledge. It is reasonable to assume that if the consuming public believes it is being unduly taxed it will adopt the tactics used so successfully by merchants against manufacturers.

Against the gloomy picture painted by merchants when they are buyers, but turned other side about when they have acquired goods, is the fact hosiery mills which were going backward in volume of business during the first half of the year now are moving forward. A direct-to-retailer mill last month sold 30 per cent more hosiery than in August of 1923, the estimate for the month being based on sales sheet showings to toward the latter end. The gain in July was better than five per cent over the corresponding month of 1923.

J. T. Duncan, of the Douglas Hosiery Mills, Douglasville, Ga., spent some time in New York last month and was quoted just prior to his departure as rather pleased with developments during his stay in the primary market. In fact, it was understood he found reasons for increasing the working schedule at his mill.

A North Carolina mill received an order for 15,000 dozen pairs of cotton half hose of special construction, designed to meet a price. Samples of the new sock were made within 24 hours after the order was submitted conditionally, and in less than three days were in the North, the order being written a day or two later. It was an instance of grabbing business on the fly.

A Pennsylvania manufacturer of children's hose had more business coming along last month than in any recent three months' period, and it looked as though the mill, which had been going through a precarious situation, now might run steadily and profitably for a time.

While there are straws a plenty pointing toward more substantial business, there still are mills which have yet to feel the stimulus that was infused in the market in July and August. A Philadelphia manufacturer, who had been operating at more than 75 per cent capacity since the first of the year and selling production, at one time last month had on his books only enough orders to keep his knitters employed three days. It looked like a shutdown or putting goods in stock. He did neither, for before the last order had been completed enough came in to assure steady operation for a full month.

Not all the slack conditions among mills are to be attributed to falling off in consumption. In silk hosiery, for example, it became expedient to sharply curtail output, while some factories were shipping out capacity production—not always at satisfactory prices, of course. Keen competition in silk hosiery served to prove the theory of the manufacturer that prices to the consumer need not necessarily advance. Manufacturers owning cheap silk were passing to dealers the advantage accruing from opportune contracting for raw material, while others, caught short of silk when the market in Japan advanced, were waiting for hosiery made from cheap silk to be absorbed.

A New York jobber had a contract with a Pennsylvania mill under which he was able to offer eight and twelve strand full fashioned silk boot stockings at less than some manufacturers were selling to jobbers. He sold at $11.37½ for twelve strand and $8.97½ for eight strand. The latter price was less than recent quotations on fine gauge spring needle silk stockings. But this jobber did what, it was predicted, many jobbers will do—find a way to reduce operating cost. He sold in case lots only, and on net terms, and it is stated his turnover was made on a margin of 50 cents a dozen. He kept his mill busy, but it is apparent the manufacturer was not taking down the per cent of profit that was exacted when selling was more a matter of simply showing samples as buyers came in. The boast was made that since the first of the year the jobber, cooperating with the mill for price, added almost one hundred new prime accounts.

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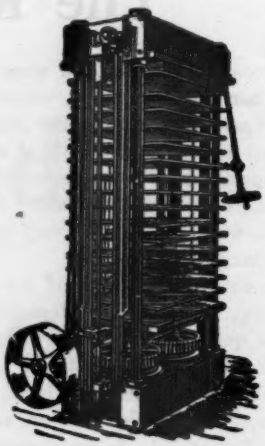

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facilities are the more flexible appear to have had more business, relatively, than some of the larger establishments where part time operation or temporary suspension means a big item in overhead cost. It would appear—and that has been the impression in the trade generally—that sales of full fashioned silk hosiery have been on the increase since this year's new low prices came out and that business in the seamless had declined. Using Department of Commerce statistics, and comparing June with April, it is found that the mills reporting increased production of seamless by 13 per cent, while the output of full fashioned fell off eight per cent. Much of the gain for seamless is credited by persons who have given the statistics some thought to the spring needle type of stocking.

In matter of price the seamless has lost little of its advantage, and price means considerable when styles are changing over night and shades bought one week may be in the discard in the next. For the coming season there will be fewer novelties in women's silk hosiery, but of shades there seems there will be no diminution in variety.

One question with which distributors still are wrestling is, will sheer hosiery be as popular as last winter and in the spring? Some well informed persons say they believe it will. Women like it, but there is the possibility the sheer may not harmonize happily with next winter's low oxford shoes, which fashion has intimated will be of the heavier and more mannish class. Pronounced advocates of the sheer say woman, rather than abondon it, would not follow the suggested shoe style. At the moment hosiery style for winter is up to woman, and of course she does not know what she is going to do about it.

Except as to the better grades, fiber silk hosiery has been in not as strong inquiry for the domestic trade, recently, as a few months ago, according to market reports. Mills using superior artificial silk, their managements say, have maintained their volume of business, and those who have experimented with the fiber silk of cotton base seem satisfied with results. The second quarter of the year showed a 12 per cent increase in production of women's fiber boot hosiery, comparing June with April. But it appeared that manufacturers were not so enthusiastic over the outlook for silk hosiery holding favor among the men folk.

Production of half hose of fiber silk and both full fashioned and seamless tram suffered a decline, the full fashioned slipping by approximately 20 per cent for the mills reporting to the Department of Commerce. Socks for men are running more and more to fancies in a variety of mixture, which may account for holding production of silk down a bit.

Printed half hose has made considerable headway as a favorite and seems to have whetted the appetite for novelties. Of course there is no limitation in the field of printed patterns, and printers seem to have solved the problem of making colors fast to the elements and laundering, but are finding much rivalry in some of the new knitted patterns.

A somewhat new type of sock is a cashmere, with dropstitch and horizontal silk stripes. It comes from a New England mill, and is reported detracting from sales of staple cashmere half hose such as was popular last winter.

What gives promise of becoming popular is a fine gauge sock of fiber plated on mercerized, with woven stripes. This also is a New England product. The striping is said to match that of the English stocking which made a hit in the markets of the United States, while the shape is understood to be more appealing. Stripes and plaids have the call in shops where youth goes for the latest things in sock lines.

A sock which soon will be, if it has not already been, put on the market is made on a machine which provides a broad field for knitting in stripes. Samples in three colors were shown some weeks ago. It is claimed for the machine that it knits both vertical and horizontal stripes, as widely separated as may be desired, thus making plaids of any dimension that a stocking could accommodate. Primary market interests who have inspected the samples appear enthusiastic over them.

Mercerized lines, for men and women, show some slight improvement in quarters where bargains are available. At the rate standard half hose was selling last month it might have been assumed prices would stiffen. The contrary was the rule, the explanation being too many mills are carrying production far ahead of market requirements. Women's seconds of 220 needle, with double sole, were reported bought by a jobber at $1.87½ a dozen. Notwithstanding the dangerously low prices which some mills are accepting for firsts, there is a persistent call for seconds, and this is true also of full fashioned silk for women, seconds being wanted as dollar retail sellers.

Since department stores have been conducting special sales of silk stockings at as low as a dollar for full fashioned advertised as firsts, there has developed retailer demand for a standard dollar stocking of silk. The nearest approach to this is a $1.25 fiber and tram in twist from a Philadelphia full fashioned mill selling to retailers. The popular price range for silks stops at $1.75, which is about what retailers ought to be getting for former standardized $2 grades. Some dealers buying at $14 a dozen still are holding at $2, but it is understood sales at that figure and above are light.

Cotton hosiery of all classes seems to have sustained a hard bump, judging from production and sales reports. The decline in output has been more severe in women's than in men's lines, for two major reasons—curtailment of production from the lofty figures of some months ago and the increasing popularity of silk at the lower prices. Demand for men's cotton socks dropped with the additions to novelties in the low price range. Prices of 176 and 144 needle half hose are a trifle higher than in July, the looped toe being quoted at a dollar a dozen and up to $1.05 for superior goods. It is not unlikely that transfer top 176 needle socks, sewed toe, were bought early last month at 97½ cents. The sock of automatic top construction appears to be in declining demand, if price is to be accepted as a barometer.

The hosiery market seems to have recovered from the setback received when price competition was being waged by a few manufacturers of infants' socks. A few orders were placed at and soon after the opening, but a great majority of the buyers who were ready to operate, they said, withdrew when prices for fiber goods began to tumble by around 15 cents a dozen for lines which had been brought out at $2.25 to $3. The opening seems to have been not well timed, and when orders failed to come in as freely as had been expected, several manufacturers became uneasy. The situation was upset when a line of fiber socks came out at $2.45—about all they were worth, com-

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pared with some in better grades. Later in the month a good appearing all-fiber sock, fancy top, dropstitch and in stripes and plain colors, came out at $2.40 to jobbers, for deliveries November and December, on January dating. This was the bottom for this class of sock.

A few mills with specially appealing patterns in 50 cents to dollar grades have had volume business. Construction and pattern made an appeal and price was hardly considered by a few buyers for some leading houses. There are predictions of big sock business ahead, as dealers made a clean-up of last year's styles and already fresh goods are seen in some retail stores.

Interest in misses' sports ribs, which were bought rather freely at the opening, lagged somewhat last month, but there was nothing to indicate anything more than a seasonal lull. A jobber here and there said there was a possibility the sports ribs might not go so well as last winter and spring; that it appeared to them there might be a return to full length stockings, more particularly for the winter season. However, there are mills which have enough sports rib orders on the books to assure them steady operation for months, and among these it is believed the ribbed-to-toe derby in mercerized, fiber and combination fabric will not, even in the next season, reach the height of its popularity.

The new lines of children's R. I. ribs and women's mercerized hosiery of similar construction from the Washington Hosiery Mills, Nashville, Tenn., were shown last month by Sutton & Vande Water, who recently were appointed selling agents for the company, of which O. B. Washington, formerly with the sales organization of the Knoxville Knitting Mills Co., is treasurer. Mr. Washington was in New York last month to install the lines.

A southern mill in the group of large manufacturers of a wide range of hosiery for men, women and children was among those to report an improvement in sales. The better situation was indicated especially in a larger flow of mail orders direct from jobbers, notwithstanding the mill's road salesmen were afield and booking business. The character of the orders, which it cannot be said were for distant delivery, was regarded in the trade a fair index of the trend of the market.

Mills have received what may be referred to as sample orders for wool hosiery, but there is little interest in men's and women's lines, and not a great deal of enthusiasm over children's. Some orders for misses' worsted ribbed-to-toe have been placed. Except as to these, few traders are willing to venture a prediction of what sort of market there is going to be for wool goods other than men's heavy socks, of which there has been some buying.

Winter cotton underwear came to the front last month after jobbers had made futile resistance to prices. Some had felt out the retail trade and booked a few small orders, enough to leave the impression the retailer eventually will buy at the market. It was sought to create the impression among mills there were carryover stocks of heavy weights, due to the mild winter of 1923-4. This representation did not have the desired effect, and gradually buyers came into the market and bought some goods. Purchasing was much restricted as to quantity, notwithstanding the price question was regarded having been disposed of.

Retailers seem determined to have mills carry stock for them, jobbers say, and the latter are no less willing to do this than were mills to lay up goods for distributors. But matters have come to a stage where, it is apparent, the jobber will have to function as such, at any rate in a conservative way.

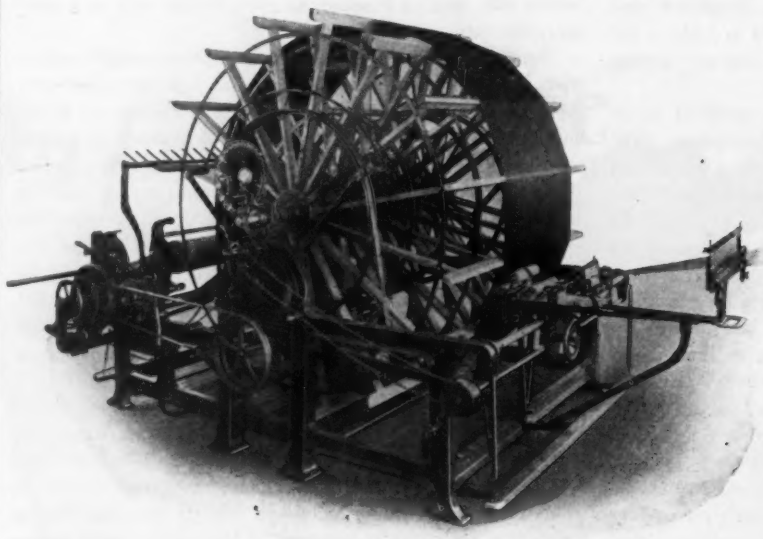
September will be the big month in heavy weight underwear, from the manufacturer viewpoint. Many buyers who ought to have placed contracts last month deferred doing so, hoping against hope prices would be lower. It looked as though the southern mills, which were the first to come out with revisions, had gone to the bottom, and as but one important mill in the North had announced a reduction —others standing pat on their opening figures—there was good ground for believing no further changes would be made. In fact, there are distributors who prefer that prices remain where they last were put. Declines at this time, it was reasoned, would precipitate mild confusion, and jeopardize orders placed by retailers.

Probably not more than 60 per cent of jobbers' prospective winter underwear requirements had not been provided for to the middle of August, when an estimate based on reports from a few representative mills was arrived at. This means that much underwear will go into distribution very late, and there is prospect of pressure on some manufacturers when the late delivery rush sets in. Mills, of course, have some stock, but production was sharply curtailed during spring and summer, and the accumulations cannot be dangerously large. There is more likelihood that goods are no more than will be required for the September rush period and that during the late fall months shipments will absorb production to almost the last case.

Prices at the counter next winter need not necessarily be higher than last winter. It is pointed out that some of the advances by manufacturers might easily be absorbed by jobber and retailer without sacrificing more than a fraction of what manufacturers have yielded. Taking, for example, a southern line of shirts and drawers, the price for deliveries June to October is but 25 cents more than for the February to May period, when a considerable number of jobbers bought right freely. The increased cost—two and one twelfth cents per garment—would be a small sacrifice for the trade to make in the interests of the usual steady flow of business. It is the higher price of cotton ribbed union suits that gives retailers the shivers. Some, it is stated in the trade, will spare themselves the unpleasantness of asking the consumer more, by offering a 15-pound suit at last winter's price of the 16-pound garment. This doubtless was in the minds of jobbers who, in reply to a question, said "prices will be 'practically' unchanged."

While the light was breaking through on the winter underwear situation clouds were gathering over that in relation to summer weights for the season of 1925. Manufacturers, at a meeting around the first of August, could find no warrant for even suggesting an opening date for men's bal briggans, and left the matter to a meeting to be called later. It was feared that the first week in September might be too early for successfully launching the light weight movement. All were at sea over cotton and, at the time, not satisfied with jobber and retailer attitude toward winter goods. It was realized that any advance in prices would be the signal for fresh trouble, and it was deemed doubtful whether an advance could be escaped. So there the matter was permitted to rest for the time.

Some manufacturers open their lines when they believe jobbers are ready to operate; some insist on naming prices early, regardless of conditions and jobber frame of mind,



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and a few in the latter class are said to have shown samples even before the meeting of manufacturers referred to. As one report came out after another of mills quoting to jobbers for next season, a disturbing state of affairs developed, eventuating in two Central West manufacturers, it was stated, naming prices lower than in the revised list following the opening in 1923 for the current retail season. It was represented subsequently that while the prices named were inadequate, they were put out as a feeler. That is the usual explanation, and it happens, generally, that the feeler causes much mischief.

Taking a survey of the situation, a New York State manufacturer said it looked to him as though there would be no formal opening; that somebody too eager for an early start had "spilled the beans."

One reason advanced for the desirability of deferring the opening until the middle of September, at the earliest, was a report which came out in the Market Service Letter of the National Wholesale Dry Goods Association that some jobbers would have to carry probably 20 per cent of their purchases of summer underwear over into the next season. If this be true, a manufacturer said, and any great number of jobbers will have goods left over, "it seems to me there would be little early buying, unless in the meantime the jobbers get rid of this reported surplus."

Several jobbers admit they will have a carryover of knitted summer underwear for men; that many retailer initial orders, it appeared, would carry them through the season. This was stated in explanation for the light volume of reorders of certain types of garments.

Several of the Central West manufacturers, making somewhat distinctive lines, are receiving reorders, for both winter and summer weights, but they are very small, running usually from two to four or five cases, and in some instances, less than case lots of a given number.

Knitted underwear for men is believed to have suffered some in competition with nainsook athletic suits, in which jobbers declare they had a better than usual volume of business. It was pointed out that a nainsook suit was selling over the counter at 25 cents less than a bal briggan suit of knitted shirts and drawers. Competition between the knitted and the cut-and-sewn is the keener since manufacturers of the former launched an advertising campaign for exploiting the knitted, and the market was flooded with nainsook goods of inferior quality and skimped in the cutting, for saving cloth.

There are pleasanter paths than those ramifying the underwear market, with the opening of spring lines while jobbers are far from completing their fall purchases, and manufacturer and jobber in a state of perplexity over the near future course of cotton.

In the sweater trades there was more activity in August than for a long time. Jobber and retailer operated more freely after manufacturers fell in line with the cooperative idea for centering on certain types of garments, such as the tuxedo and slipover coats, as a means for stabilizing the market. The scheme produced the expected result. There had been scepticism of novelties.

The knitted outerwear market was given further impetus with the opening of bathing suit lines for next season, at prices down by around five to ten per cent from last year's opening figures, and an indication original lines would be adhered to. While there was no rush of jobbers to look at samples, it seemed to be in the air that there would be a fair volume of early bookings, notwithstanding business in bathing suits this year tapered off materially in the matter of reorders.

Among the Knitting Mills.

Paducah Hosiery Mills, of Paducah, Kentucky, will install additional equipment at the Benton, Kentucky, branch, it is announced.

Scottsboro Hosiery Mills, Scottsboro, Alabama, have added 12 new machines recently.

Real Silk Hosiery Mills, Indianapolis, Ind., have had prepared plans and specifications for a dyehouse to be constructed. Lockwood, Greene & Company are the engineers.

Slane Hosiery Mills, High Point, have begun operations in their additional plant, which houses 230 knitting machines, 45 loopers and 14 sewing machines, which will give the mill a capacity of 350 dozen pairs of hosiery daily with its existing equipment.

Lehigh Silk Hosiery Mills, Philadelphia, Pa., will erect an additional manufacturing plant, a cafeteria, a boiler house and a plant for dyeing and bleaching. The factory will be of reinforced concrete, brick and hollow tile construction, four stories, 89 x 220 feet, with a wing two stories, 40 x 60 feet, which will be used for the cafeteria, etc. The same construction will be used in the boiler house and other buildings which will be two stories high and will cover an area of 35 x 200 feet.

The Dillon-Vitt Underwear Company, of High Point, has removed to Statesville, N. C., and will operate a plant of 200 machines on men's and boys' underwear. P. M. Dillon is secretary-treasurer.

U. S. Knitting Mills, Reading, Pa., will establish a branch plant at St. Louis, Missouri, for underwear. The plant will be electrically driven and will be located in a leased building.

The Hurlburt Hosiery Mills, Tuscaloosa, Ala., has begun operations in its recently established plant. W. C. Kyle, formerly of Chattanooga, Tennessee, is manager.

The Andala Company, Inc., Andalusia, Alabama, of which J. G. Scherf is vice-president and general manager, are installing additional machinery and equipment to increase its capacity. The plant manufactures underwear. Barnes, McGoey and Ely, 349 Broadway, New York City, are selling agents for the mill.

The Olympic Knitting Mills, Inc., New York, N. Y., recently chartered with a capital of $35,000, will operate a local plant for the manufacture of hosiery. The company is headed by H. Weiss and A. Plancher, and is represented by C. Hiller, 276 Fifth Avenue, New York.

The Wayne Knitting Mills, Inc., Fort Wayne, Ind., has filed notice of an increase in capitalization from $600,000 to $1,000,000, a portion of the proceeds to be used for general expansion.

The Orange Blossom Knitting Mills, Newport Beach, Cal., have completed plans and will commence work at once on a new mill at the Newport Boulevard and Palisades Road. It will be one-story and is estimated to cost close to $20,000. A. V. Napier, head of the company, will be in charge of erection and the equipment installation.

The Tryplex Hosiery Mills, Inc., New York, N. Y., has been organized under state laws with a capital of $20,000,

to operate a local knitting mill, for which arrangements will be perfected at an early date. The new company is headed by N. and L. Cohen, and D. Berstein, and is represented by M. A. Vogel, 1431 Broadway, New York.

The Cleona Knitting Co., Cleona, Pa., has been formed under state laws with a capital of $15,000, and proposes to operate a local mill for the manufacture of hosiery. Operations will be commenced at an early date. George W. Delker, Cleona, is treasurer and representative.

Oakes Brothers, Jamaica Plain, Mass., manufaacturers of knit goods, are said to be planning for the rebuilding of the portion of their local mill recently destroyed by fire with loss estimated at $20,000, including equipment. The building is located at 6 Bismarck Street, and occupied under lease.

The Hoover Knitting Mills, Inc., Brooklyn, N. Y., recently organized with a capital of $20,000, will operate a local hosiery mill, for which it is understood arrangements will be perfected at an early date. The company is headed by H. Schiff and E. Vagen; it is represented by I. M. Leibner, 63 Park Row, New York.

The Reading Hosiery Mills, Inc., Reading, Pa., has been formed under state laws to operate a local knitting mill. The company will have an initial capital of $1,000. John P. Brenn, West Reading, will act as treasurer and representative.

The Bronx Knitting Mills, Inc., New York, N. Y., has been formed under state laws with a nominal capital of $5,000, to operate a local plant, for which it is expected to perfect arrangements at an early date. The company is headed by A. Mittleberg and B. Zuckerman. It is represented by Samuel Cherkos, 116 Nassau Street, New York.

The Taubel-Scott Co., Inc., Mount Carmel, Pa., has sold its local knitting mill and will move the equipment to some of its other plants in eastern Pennsylvania. Operations have been resumed at the Shamokin, Pa., mill. The company is said to be arranging for a change of company name to William F. Taubel, Inc., reverting to the original company name. Rufus W. Scott has disposed of his interest in the company to Clarence H. Taubel. The main plant of the company is at Riverside, N. J.

The Well Knit Silk Mills, Inc., New York, N. Y., recently organized with a capital of 200 shares of stock, no par value, proposes to operate a local knitting mill. The company is headed by J. Goldberg and I. Golden. It is represented by J. W. Kaufman, 36 West Forty-fourth Street, New York.

The Reid Hosiery Co., Philadelphia, Pa., recently formed with a capital of $30,000, under state laws, will operate a local knitting mill. Samuel Reid, 957 Foulkrod Street, has been elected treasurer of the company.

The Lehigh Silk Hosiery Mills, Inc., Philadelphia, Pa., will begin the construction of a new knitting mill on Butler Street, to be four-story and basement, 86 x 220 feet, with two-story structure adjoining, 35 x 200 feet. The last noted will be equipped as a boiler and dye house. The company also purposes to erect a two-story building for employees welfare work and cafeteria, to be 40 x 60 feet. The general contract for the work has been awarded to Harry Brocklehurst, 12 West Norris Street, Philadelphia.

The Esco Hosiery Co., 890 Broadway, New York, N. Y., has arranged for an increase in capital from $140,000 to $250,000 for general expansion.

The States Hosiery Mfg. Co., New York, N. Y., has been chartered under state laws with capital of $20,000, to operate a local knitting mill, for which arrangements will be perfected at an early date. The company is headed by J. and L. J. Friedman. It is represented by J. J. Tashof, 44 Cedar Street, New York.

The Cornwells Knitting Mills, Inc., Cornwells, Pa., has been formed under state laws to establish and operate a local mill. The company will begin operations with a capital of $35,000. A. T. Lippincott, Cornwells, has been elected treasurer of the company.

Onyx Hosiery, Inc., Wharton, N. J., has work under way on a new addition at its local knitting mill, to be equipped for dyeing and other operating service, with estimated cost placed at $25,000.

The Mohawk Knitting Mills, Inc., 148 Madison Avenue, New York, N. Y., has filed notice of a reduction in capital from $100,000 to $80,000.

A recent consolidation of interest to the trade is the announced purchase of the Taubel-Scott properties at Lenoir City, Morristown and Cleveland, Tennessee, by Colonel Charles H. Bacon, President of the Loudon Hosiery Mills group with plants at Loudon, Greenville, Newport and Sevierville, Tennessee. The new organization will be known as the Charles H. Bacon Company and will consist of seven mills with a production of ten to twelve thousand dozen pairs of hosiery a day.

Old Hickory Powder Plant Fire.

Spontaneous combustion is supposed to have caused probably the most spectacular fire the South has ever seen when some 45 million pounds of smokeless powder belonging to the government and stored in buildings covering an area of some forty acres burned recently at the Old Hickory Powder Plant near Nashville, Tenn.

The Old Hickory Powder Plant was built in 1918, being the largest munitions development of the war, and in December, 1920, was sold to the Nashville Industrial Corporation for the purpose of disposing of the equipment and converting the buildings and other portions of the property into an industrial development for peace time uses. At that time the government reserved the privilege of storing the smokeless powder in certain sections of the plant over a certain period and agreeing at that time to protect the corporation from any loss or damage resulting from such storage. Practically all of the machinery destroyed was reserved by the government for the use of the ordinance department. Only a very negligible portion of the equipment lost was owned by the Nashville Industrial Corporation, all of which was covered by insurance.

The fire in no way altered the status of the equipment for sale by the Nashville Industrial Corporation who are continuing their work of industrializing Old Hickory.

Joseph Dixon Crucible Co., Jersey City, N. J., manufacturers of Dixon's silica-graphite paint, have placed on the market another paint product known as Dixon's red lead-graphite primer. The pigment of this primer consists of flake silica-graphite, red lead and oxide, and the vehicle is linseed oil. The primer, it is stated, will dry in 22 hours under normal conditions. It is produced to meet the needs of those preferring a red lead paint for priming coats.

Lower Your Production Costs
NOW!
"HURRICANE" DRYER
Works 60 Times as Fast

A STATIONARY drying room of about 850 square feet of floor space, requiring from 6 to 24 hours to dry each batch of goods, was replaced by a "HURRICANE" DRYER which does the same work in from 6 to 30 minutes:—*just 60 times as fast!*

Under the old method it cost $.0209 per pound for drying while the "Hurricane" produces better work at a cost of $.0045;—a saving of $.0164 on every pound dried. This is a reduction in cost of 78% which amounts to $12,956.00 annually for this company.

Write for more complete information.

THE PHILADELPHIA DRYING MACHINERY COMPANY

Manufacturers of Dyeing, Bleaching, Drying and Finishing Machinery
Stokley Street above Westmoreland

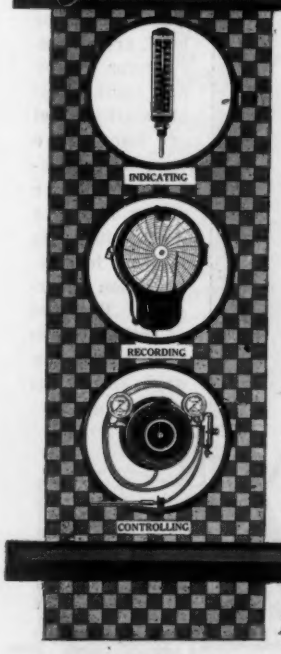
PHILADELPHIA, PA.

Canadian Agents: Whitehead, Emmans, Ltd. Montreal & Hamilton.

HURRICANE
Ideal Drying Every Day

New England Agency: Hurricane Engineering Co. 53 State St., Boston

Tycos temperature instruments



INSTALL *Tycos*

The consequences are uniformity and constancy of results on the following processes:

Kier Boiling
Bleaching
Conditioning
Crabbing
Drying
Dyeing
Finishing
Scouring
Slashing
Soaping
Steaming
Tentering
Testing
Washing
Padding
Jigging

Literature upon application. Or specific information by letter on any of the above processes.

Taylor Instrument Companies
ROCHESTER N.Y.

456 Theres a *Tycos* and *Taylor* temperature instrument for every purpose

AUTO GYP
Process of Bleaching and Dyeing
IN ONE OPERATION

Not Only Bleaches and Dyes in One Operation

. . . . but by producing a superior finish to the goods makes sales and satisfaction positive.

The AUTO GYP method conserves floor space, saves enormously in labor, materials and time—and only one reel dye machine is needed.

AUTO GYP
Process of Bleaching and Dyeing
IN ONE OPERATION

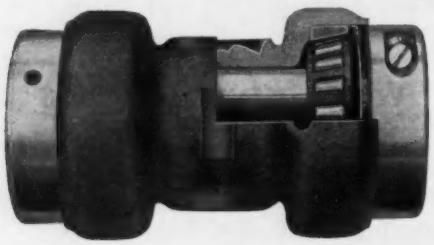
Send for FREE Book

SURPASS CHEMICAL CO., Inc.
Office, Factory, Laboratories,
1254-56 Broadway, Albany, N. Y.

Announce New Roller Hanger Bearing.

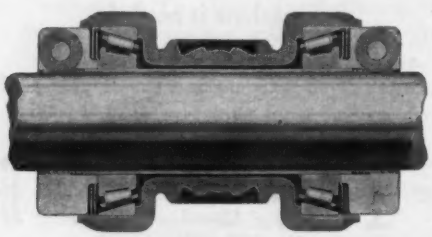
The Dodge Manufacturing Corporation, Mishawka, Indiana, has placed on the market a new lineshaft bearing embodying the Timken tapered roller bearing, as well as several new features of construction. The special requirements that must be met by any appliance used in power transmitting service, such as ruggedness, simplicity, interchangeability and trouble-free lubrication, have been given the most careful consideration in the design and manufacture of this new Dodge product.

The Dodge-Timken roller hanger bearing is a simple bearing. There are only five parts to the complete assem-



bly. It consists of two Timken tapered roller bearings mounted on a ground and slotted steel tube and fitted to an accurately machined housing. The ends of the steel tube are threaded to receive clamping collars designed to secure accurate adjustment of the bearings on the tube. This adjustment is made at the factory and need not be altered by the user.

The mounting of the tapered roller bearings, as described, insures full utilization of the bearings for both radial



and thrust loads. It also adds to the ruggedness of the assembly and is said to be of particular value in resisting the side weave of heavy driving belts.

The method of fastening the steel tube or sleeve to the shaft permits its use on any commercial shafting. This fastening is accomplished by simply setting up the screws in each of the two clamping collars.

The dust-proof feature of this bearing is of importance. The sleeve on which the bearings are mounted extends from end to end of the housing. Liberal grease compartments are provided inside of the housing and outside of the tube. The outer ends of the bearings are protected against dust by special metallic grease seals which eliminate friction at this point and prevent dust working in or the lubricant from working out. These grease seals take the place of felt washers or packing.

The erection of this new lineshaft bearing is very simple. It is only necessary to slip the bearing over the shaft and set up the clamping screw in each of the split clamping collars. To remove it is necessary to loosen the screws in the collars and slip the bearing off the shaft.

Three bulletins in an attractive black binder have been issued by the Newport Chemical Works, Inc. They are for general distribution to the trade:

The first of these bulletins is entitled, "Newport Dyes Versus Foreign Prototypes." It consists merely of two long tables of dyes. The first tabulates numerically, by Schultz and Color Index numbers, the names of 425 Newport colors, and in the adjoining column, the names of the foreign dyes identical with those colors. The second list tabulates alphabetically in one column the foreign colors and in the other the Newport equivalents.

Bulletin No. 2 is a 15-page treatise on "The Dyeing of Anthrene Colors on Cotton." It covers the subject in a manner every dyer will appreciate, listing the Anthrene colors, telling what they will do and explaining the processes, and giving the formulas necessary to produce satisfactory work.

The third bulletin in seven pages describes the dyeing of the various kinds of artificial silk, and gives formulas used with the direct colors listed. Owing to the present popular use of artificial silks this comprehensive treatise should prove extremely valuable to all engaged in dyeing these fabrics.

The American Chamber of Commerce in Germany, Equitable Bldg., Friedrich, Str. 59/60, Berlin, W. 8, Germany, has produced the "American Buyers' Guide," which is a classified directory and handbook for American importers and exporters. It contains much of interest to American concerns catering to German business. Copies may be secured from the Chamber at $2.00 each.

FALLS

in mills, both on stairs and on the level, are responsible for a very high percentage of fatalities and of lost time claims. One fatality in the course of a year results in a big increase in compensation insurance. The loss of trained workmen even for a day slows up production.

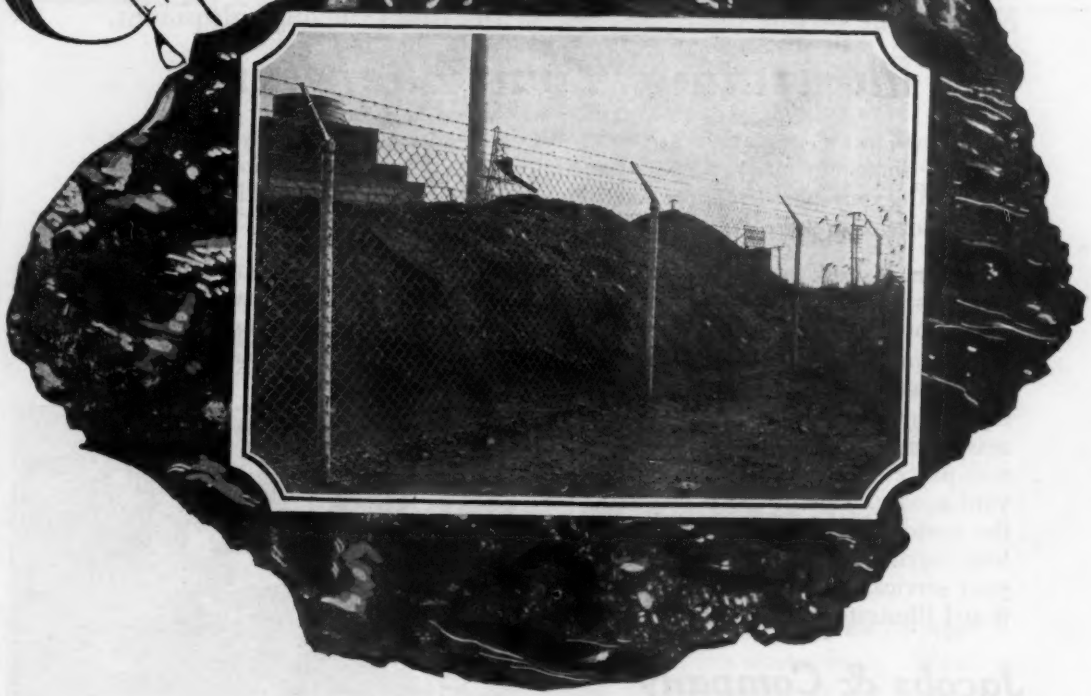
FERALUN
Anti-Slip Treads

MAKE WALKWAYS SAFE

American Abrasive Metals Co., 50 Church St., New York, N. Y.

ATLANTA, GA.: BEAULLIEU & APPLEWHITE CO.
Citizens and Southern Bank Bldg.

Lock Out Coal Theft



A fence that saves coal!

Many carloads of coal are saved every year by Anchor Post Fences. Coal is saved because theft is prevented.

Strong, unclimbable, impregnable, an Anchor Post Fence keeps out the pilferer.

It is made of heavy chain link mesh—No. 6 wire. Supported on sturdy steel U section posts that have no hidden, unprotected surfaces where moisture can collect and rust form. *Drive-Anchorage* permanently maintains fence alignment, defying soil disturbances due to repeated frosts and thaws.

Every part *galvanized throughout* by the thorough hot-dip-spelter method.

The nearest Anchor Post Office or sales agent will gladly give you complete information on just the fence you need. Phone, write or wire.

ANCHOR POST IRON WORKS

ATLANTA, GA: Beaullieu & Applewhite, Citizens Southern National Bank Building. Boston, Mass.: Anchor Post Iron Works, 79 Milk St.; Greenville, S. C.: H. H. Orr, 315 Palmetto Bldg.; Savannah, Ga.: C. M. MacLean Co, 20 East Bay St.; Charlotte, N. C.: R M. Lane, P. O. Box 1375; Birmingham, Ala.: C. C. Caldwell, 2011 Third Ave.

BRANCH OFFICES AND SALES AGENTS IN OTHER CITIES

Anchor Post Fences

2542G

FIRM - *because Anchored* PERMANENT - *because Galvanized*

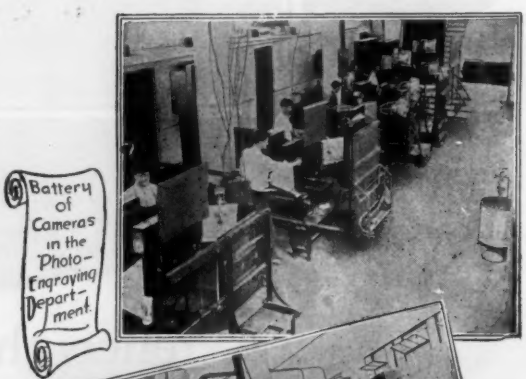
If It's A Broadside—

If it is an especially large illustration for an especially large piece of literature, chart, birds eye view, map, etc. Whether it be in one or more colors, our plant is equipped to supply your needs. No halftone or line plate too large or too small for our equipment.

Illustrating Your Literature

Sometimes in the preparation of your sales and advertising plans you find the need of some especially prepared piece of literature, the execution of which will baffle your photographer, electrotyper and printer. Frequently you may seek a service that the ordinary plant cannot give.

Our plant is designed and equipped for the accomplishment of many difficult products that cannot be secured from most photo-engraving establishments; is equipped to furnish the best of photo-engraving, electrotyping, printing, nickeltyping, commercial art and allied service, whether large or small, whether one or more colors. The extent of our equipment is reflected in the large process camera, which can furnish you with process color plates as large as a yard square. One of the 6 largest in the world. If you have an idea you wish carried into execution, we are at your service. We will gladly perfect it and illustrate it.

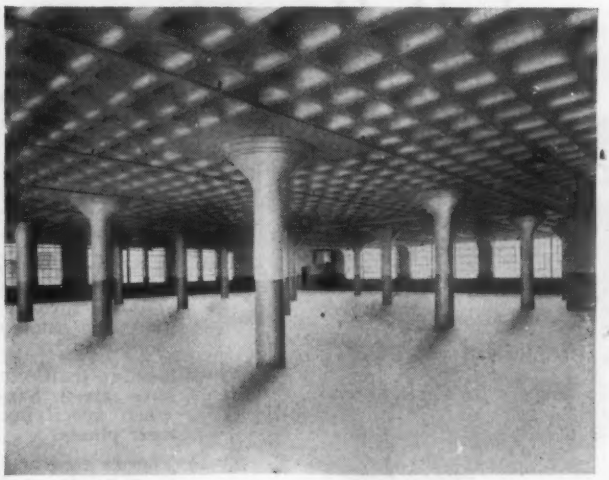


Battery of Cameras in the Photo-Engraving Department

A Close Up View of One of the 6 Largest Color Process Photo-engraving Cameras in the World—Installed in the Photo-engraving Dept. of Jacobs & Co.

Jacobs & Company
Clinton, S. C.

Advertising, Commercial Art
Photo-Engraving—Electrotyping
Nickeltyping
Color Printing



TRADE MARK
Reg. U.S. Pat. Off.
THE BAY STATER

A mill white that retains its cheerful brightness

It is remarkable the way Wahcolite will lighten the interior of a factory. This wonderful mill white diffuses light to every corner.

Wahcolite drys hard and smooth. A wall coated with Wahcolite is less affected by dust and dirt than any other finish and stays white longer. And Wahcolite is easy to clean.

Many large manufacturers find Wahcolite to be most economical. Time cannot turn it yellow. It will not chip, crack or peel.

Send today for complete information about this master finish. Write for your free copy of our booklet No. 19, "Keeping in the Spotlight."

ON THE OUTSIDE

Bay State Brick and Cement Coating is the ideal outside finish for walls of stucco or cement. It creeps into the pores of the walls and seals them absolutely moisture-proof.

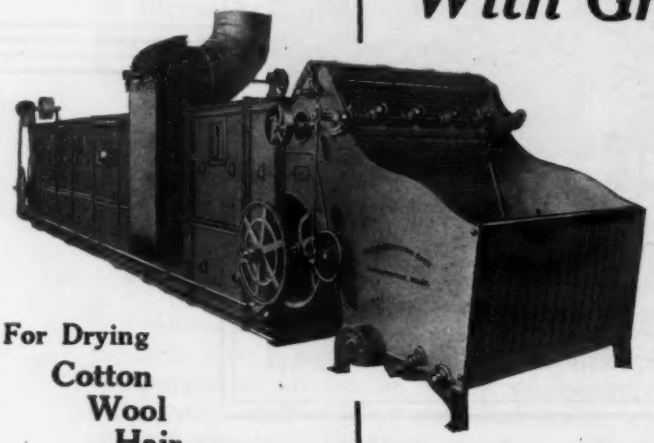
WADSWORTH, HOWLAND & CO., INC.
BOSTON

Brooklyn Jacksonville

WAHCOLITE
A Bay State product

BAY STATE PAINTS VARNISHES

Better Drying With Greater Economy



For Drying
Cotton
Wool
Hair
Etc.

Sargent Dryers have established a world known reputation for economy in operation and in maintenance costs.

The ability to dry rapidly, thoroughly and uniformly, yet preserving the natural life and structure of the fibre, and using an unusually small amount of steam is real economy.

Leading textile men all over the country have given Sargent Dryers preference when specifying drying machinery for their plants.

There's a Sargent Dryer designed to meet your needs—write today for our catalog.

C. G. SARGENT'S SONS CORPORATION
GRANITEVILLE, MASS.
Fred H. White Sou. Agent, Charlotte, N. C.

SARGENT DRYERS

"The World's Best Dyeing, Bleaching and Scouring Machinery."

DURABLE K-W UNIVERSALLY USED

"The World's Best Dyeing, Bleaching and Scouring Machinery."

The Things That Count

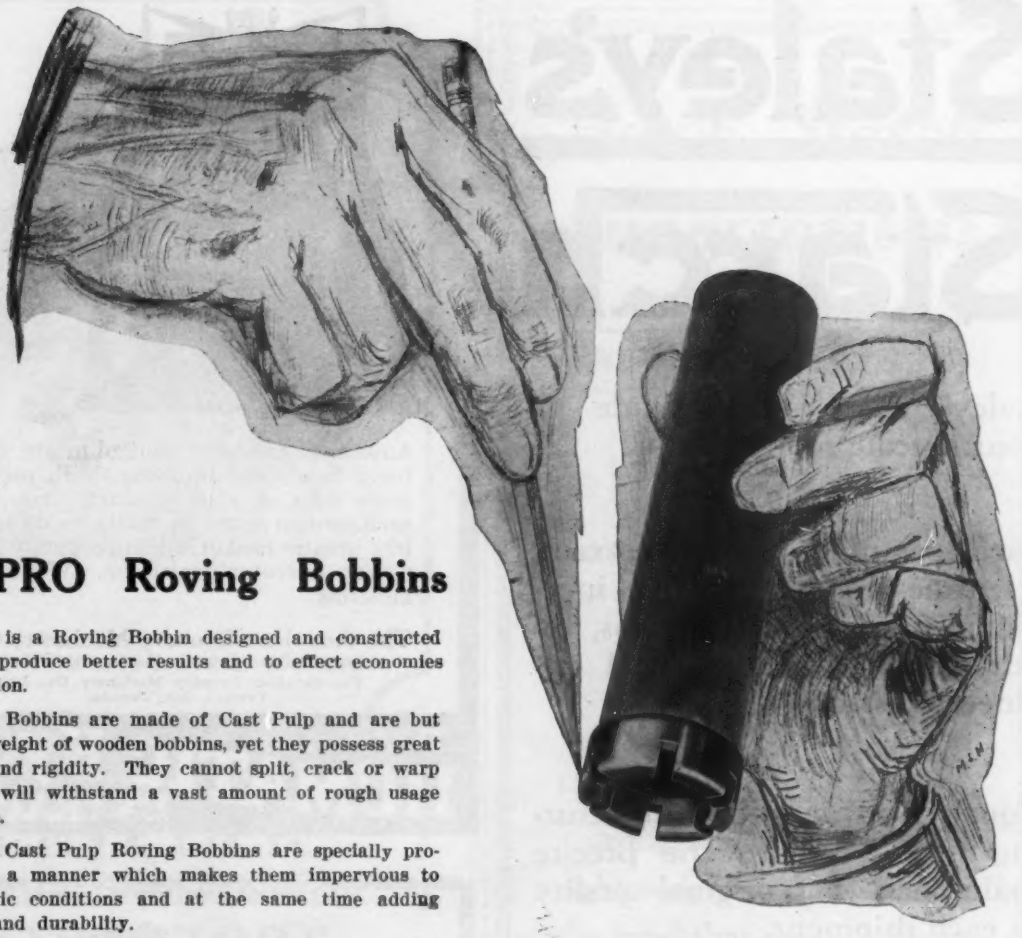
In manufacturing there must be one standard by which every machine of a similar nature is judged—world recognition of Klauder-Weldon Dyeing, Bleaching and Scouring Machinery's past performance and endurance has established them as the standard in the Textile industry, and brought to them the reputation of "The World's Best Dyeing, Bleaching and Scouring Machniery."

The ever increasing number of textile men who insist upon K-W machines for their mills is ample proof of their efficiency and dependability.

Our knowledge and experience in this field enables us to make suggestions and help you solve any finishing problem in your mill. Send your problems to us today and ask for our illustrated catalog.

KLAUDER-WELDON
DYEING-BLEACHING-SCOURING-MACHINERY

THE KLAUDER-WELDON DYEING MACHINE CO.
BETHAYRES, PA., U. S. A.
H. G. Mayer, Southern Agent, Realty Bldg., Charlotte, N. C.



TEXPRO Roving Bobbins

HERE is a Roving Bobbin designed and constructed to produce better results and to effect economies in operation.

TEXPRO Bobbins are made of Cast Pulp and are but half the weight of wooden bobbins, yet they possess great strength and rigidity. They cannot split, crack or warp and they will withstand a vast amount of rough usage and abuse.

TEXPRO Cast Pulp Roving Bobbins are specially processed in a manner which makes them impervious to atmospheric conditions and at the same time adding strength and durability.

Note the Ferrule: It is made of metal and assembled to the Cast Pulp form. It can not come loose and it engages readily to the driving pin. The use of this Ferrule means lasting strength to the bobbin. The lugs at the base will not break because of hard usage, accidental dropping or other abuse.

This metal Ferrule, as you will see by the illustration, extends up inside the base of the bobbin and thus withstands the great wear that unprotected other type bobbins are subjected to at this point.

TEXPRO Cast Pulp Roving Bobbins mean more efficient operation, freedom from many bobbin troubles and longer bobbin service. They are made to fit all standard frames.

Send for sample TEXPRO Cast Pulp Roving Bobbin. Examine it carefully, put it to work. You will at once recognize its many superior qualities.

Mfd. Under Drake Patents.

THE TEXTILE PRODUCTS CO.
HARTFORD, CONN.

Patents Pending

TEXPRO BOBBINS
—cost less and last longer

TEXPRO cast pulp BOBBINS

Staley's Starch

Staley's starches are made to your specific requirements.

Each formula is based on exact, scientific analysis of your individual production problems, by our technical and chemical engineering staff.

Equally advanced manufacturing facilities assure the precise maintenance of original quality in each shipment.

That is why Staley starches hold first place throughout the textile industry; why their record for results is unsurpassed.

You, too, can benefit by Staley methods. Our consulting staff is at your service.

A. E. STALEY MFG. CO.

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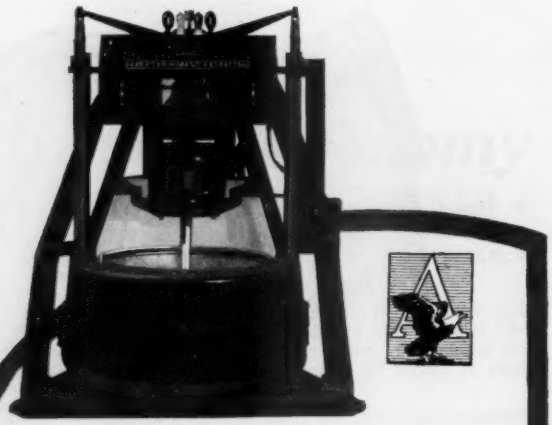
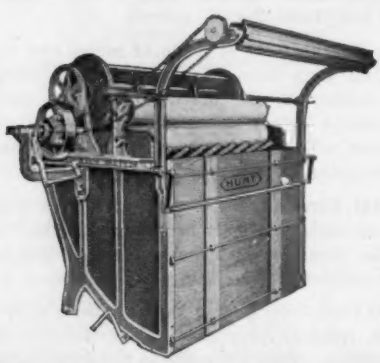


Automatic extractor control means uniform finish and uniform finish means more sales of your product. You get such control in the Humatic, along with 10% greater basket holding capacity and perfect operator protection. Write for bulletins.

The American Laundry Machinery Co.
Specialty Dept. C, Cincinnati, Ohio
The Canadian Laundry Machinery Co., Ltd.,
Toronto, Ont., Canada.

The American **HUMATIC Hydro EXTRACTOR**

RODNEY HUNT MACHINE COMPANY



REEL MACHINES

Ideal for Bleaching Cotton or mixed fabrics by the Peroxide Process.

Booklet No. 1119

RODNEY HUNT MACHINE CO.

47 Mill Street Orange, Mass.

TYPE EU EXTRACTOR
BUILT WITH 42, 48 AND 60-INCH BASKETS

FLETCHER
ELECTRIC UNDERDRIVEN EXTRACTORS

TWO important features of simplicity and accessibility characterize these electric underdriven extractors. The motor rotor is mounted directly on the basket shaft, eliminating belts, clutches, gears and couplings. Open top affords easy access to the basket from all sides and a touch of the button takes care of the starting. Adjustable asbestos-lined brake band interlocks with control, so brake and current cannot both be on at the same time.

Write to us for further details.

FLETCHER WORKS
INCORPORATED
Formerly SCHAUM & UHLINGER
PHILADELPHIA, PA.

Sales and Service in Boston, Chicago, Charlotte, N. C., Atlanta, Ga., Portland, Ore., Los Angeles and San Francisco.

Hawk Starch Superiorities

UNIFORMITY

STRENGTH

PURITY

ECONOMY

HAWK STARCH produces a strong, smooth warp of the right weight and pliability—the kind that weaves easily.

HAWK STARCH can be furnished in any desired viscosity. Just as your tailor "fits" the suit he makes for you, so do our experts adapt the starch to your local mill conditions.

STEIN, HALL & CO., INC.
61 BROADWAY, NEW YORK

Boston Charlotte, N. C. Chicago
Providence Troy Philadelphia

NEOLAN COLORS

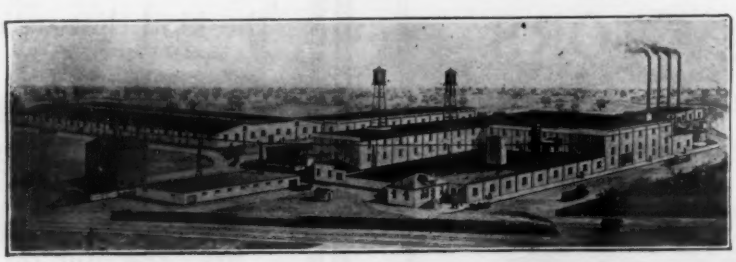
The Neolan Colors of The Society of Chemical Industry in Basle form a new class of dyestuffs hitherto unknown, and are suitable for the dyeing of wool in all stages of its manufacture.

The main features of this new class of dyestuffs are that they yield shades fast to light and milling, and are dyed in a sulphuric acid bath. These dyestuffs combine the advantages of dyeing like ordinary acid colors with fastness properties which otherwise can only be obtained with chrome or mordant colors.

Sole Representative in the United States for the
SOCIETY OF CHEMICAL INDUSTRY IN BASLE
Basle, Switzerland

Sole Selling Agents for Dow's Indigo and Midland Vat Blues

iba Co. Inc.
BRANCHES BOSTON PROVIDENCE PHILADELPHIA CHICAGO COLUMBUS, GA.
CEDAR and WASHINGTON STS.
NEW YORK



VICTOR MILL STARCH
The Weaver's Friend

It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

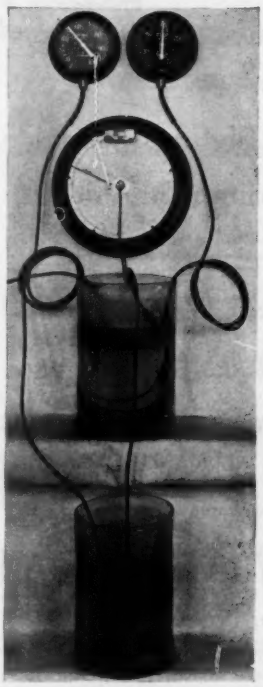
A trial order will convince you that VICTOR STARCH has no equal on the market.

THE KEEVER STARCH COMPANY, Columbus, Ohio

Southern Agent: MR. DANIEL H. WALLACE, Greenville, S. C.

If you are not already using VICTOR STARCH call on our representative for a demonstration at your convenience.

He Didn't Believe It Could be Accurate



The indicating thermometer—upper left—reads 52° Fht., the temperature of the bath in the lower jar, in which the recording thermometer bulb is immersed.

The indicating thermometer—upper right—reads 180° Fht., the temperature of the water in the upper jar, in which the 20 feet of connecting tube is placed. The steam line which is used to heat the water is shown emerging from the left hand side of the jar.

"How can I expect accurate records from this Foxboro Recording Thermometer?" asked a customer. "There's 20 feet of connecting tube subjected to a high room temperature. You can't tell me that the record isn't affected by it."

This Test Showed Him He Was Wrong

We placed the recording thermometer bulb in a chilled bath so that the pen registered 52°. Then we immersed the entire 20 feet of connecting tube in the water at 180° Fht. and the pen didn't move from 52°.

He was convinced.

Foxboro Recording Thermometer bulbs are filled, according to the range and service required, with a gas or a highly volatile liquid. Mercury is never used. The volume of vapor or gas in the fine capillary tube is so small compared with that in the bulb that connecting tubes more than 250 ft. long are now in use under conditions of extreme heat or cold with perfect assurance of accuracy.

We have not been content simply to develop the Improved Helical Tube Movement, but we have made sure that its accuracy cannot be affected by outside conditions. Foxboro Recording Thermometers are guaranteed accurate within 1% total chart range. They are absolutely reliable.

For complete information, write for Bulletin AS 104-1.

THE FOXBORO CO., Inc.

Neponset Avenue Foxboro, Mass., U. S. A.
New York Chicago Boston Philadelphia Pittsburgh
Cleveland Rochester Tulsa Los Angeles
San Francisco Portland, Ore.
Birmingham, Brown-Marx Bldg.

FOXBORO

REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

6348

TEXTILE SPECIALTIES — JACQUES WOLF & Co.

MONOPOLE OIL

REG. U.S. PATENT OFFICE

CREAM SOFTENERS
Neutral Sulphonated Cotton Softeners

HYDROSULPHITES
for all purposes

DIASTAZYME
A de-sizing agent

SOLUBLE OILS
Alizarine Assistants Turkey Red Oils
Sulphonated Castor Oils

GUMS
Arabic, Tragacanth, Karaya

BLEACHING OIL
A Kier solvent

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MANUFACTURING CHEMISTS AND IMPORTERS
PASSAIC, N. J.

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162 West Kinzie Street Chicago, Ill.
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Manufacturers of

CHEMICALS

PHILADELPHIA, PA. BRISTOL, PA.

SODIUM HYDROSULPHITE—

Sulphoxylates and Allied Products.

LYKOPON—Sodium Hydrosulphite—For reducing Indigo and vat dyes. Of highest quality and absolutely standard.

FORMOPON—For discharging.

FORMOPON EXTRA—For stripping.

PROTOLIN—For stripping.

INDOPON W—Indigo Discharge Assistant.

TARTAR EMETIC—Technical.

Represented by

The MAKENWORTH COMPANY

Greensboro, North Carolina

Chas. Lennig & Company

Incorporated

40 North Front Street Philadelphia, Pa.

Works: Bridesburg, Philadelphia, Pa.

Manufacturers of

Concentrated Sodium Sulphide

Crystal Sodium Sulphide

Also manufacturers of the following chemicals:

ALUM	GLAUBER SALT
SULPHATE OF ALUMINA—	OIL OF VITRIOL
Iron Free	NITRIC ACID
PAPER MAKERS' ALUM	MURIATIC ACID
WATER FILTRATION ALUM	NITRATE OF LEAD

Represented by

The MAKENWORTH COMPANY

Greensboro, North Carolina

THIS Magazine is a product of our plant.

OF more interest to you, however, is the fact that we are equipped to handle anything which you may need in the printing line. We make a specialty of the "Better Class of Blank Books and Mill Office Supplies."

THE

A. J. SHOWALTER CO.

DALTON, GEORGIA

"The House of Better Service and Prices"

Warren Soaps

Preferred Stock

The best quality tallow, palm, and red oils and olive foots, carefully balanced with the purest chemicals for your special purpose.

Uniformity guaranteed by test before shipment.

Warren Soap Warren Service

Warren Soap Mfg. Co.

Established 1870

77 Summer St. Boston, Mass.

Incorporated 1890

Uniform in Application

VICTROLYN

Penetrating, Lubricating, Dependable Assistant in Warp Sizing

KLORASENE

will remove Oil Stains.

If you are troubled, write us.

BOSSON & LANE

Manufacturing Chemists

ATLANTIC, . MASS.

"BRETON" MINEROL

For Cotton Yarns

"It develops fully the color"

BORNE, SCRYMSER CO.

Established 1874

17 Battery Place, NEW YORK

BOSTON PHILADELPHIA

Works: Bayway, Elizabeth, N. J.

A Few of the Facts

Protection to the tensile strength of wool and cotton yarns, better penetration of the dyes or bleach, as well as absolutely clean goods are only a few of the many reasons for the continually increasing demand by mills the country over for the special purpose alkalies

Wyandotte Textile Soda
Wyandotte Concentrated Ash
Wyandotte Kier Boiling Special

The microscope and camera in the hands of practical men have revealed many of the secrets of consistent production of high quality textile fabrics. When these powerful aids to investigation are turned upon fabrics treated with the Wyandotte Special Purpose Alkalies the splendid condition of the fibres denotes the beneficial results obtained by the use of these scientifically built mill supplies.

Then, too, when you compare the results obtained and the cost, you will be satisfied that these superior benefits do not add to your production expense.

Ask your supply man.

The J. B. FORD CO., Sole Mnfrs.
WYANDOTTE, MICHIGAN

UCPC

Direct Sulphur Chrome } **Dyes** { **Acid Vat Basic**

Special Shades Matched

VELVETEEN

The Best Boil-off and Finish

Softeners Oils Finishes

UNITED CHEMICAL PRODUCTS CORPORATION

Importers, Exporters and Manufacturers

York and Colgate Sts. Jersey City, N. J.

Southern Office 307 Commercial National Bank Building Charlotte, N. C.

Pawtucket, R. I.
Norwalk, Conn.
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Established 1815

ARNOLD, HOFFMAN & CO., Inc.

Providence New York Boston Philadelphia Charlotte

All Kinds of
HEAVY CHEMICALS
Sole Agents for
BELLE ALKALI CO.
of Belle, W. Va.
Manufacturers of
LIQUID CHLORINE
BLEACHING POWDER
CAUSTIC SODA
Solid and Flaked

We solicit your inquiry for prompt or future delivery

Solubility—as well as shade and strength—is a valuable characteristic of

KATIGEN DEEP BLACK GGN CONC.

GRASSELLI DYESTUFF CORPORATION

117 Hudson Street, New York

Boston
Chicago

Providence
Charlotte

Philadelphia
San Francisco

Even Dyeing Assured By DIASTAFOR

—For years Diastafor has been the leading diastatic malt extract for textile use.

—Standardized and reliable, Diastafor is a perfect desizing agent. Easy to use, it improves the quality of your fabrics and results in absolutely uniform dyeing.

—This means greater sales for the textiler.

Give Diastafor a trial. Write to us for full particulars.

THE FLEISCHMANN COMPANY

Diastafor Dept.

695 WASHINGTON ST. **NEW YORK, N. Y.**

Diastafor Warehouses:

Boston, Mass. **Cincinnati, Ohio** **New York, N. Y.** **Philadelphia, Pa.**

ROLLER
CLEARER
SLASHER

Quality and Service

CLOTHS

Manufacturers are obtaining such perfect results from our Roller Cloths because it is made of the right material, with just the right cushion and uniformity of surface.
Our Clearer Cloth is constructed of the highest grade materials with strong nap that does not pull out and its uniform length is such that rolls are cleared entirely of short fibre.
Our Slasher Cloth is of the same high quality construction. It has sufficient cushion and is porous enough to thoroughly force the sizing into the yarn.
A small trial order will convince you of the superiority of these perfect cloths. Ask for sample and prices.

PHILADELPHIA FELT CO.

FRANKFORD, PHILADELPHIA, PA.

Southern Sales Agent, M.C. Sanders, Greenville, S.C.

ALLEN COMPANY

PATENTED

WOODEN BEAM HEADS

Are Light in Weight and Practically Unbreakable

which insures longer life—ease of handling and a big savings in freight charges.

They are constructed of three pieces of specially selected, kiln dried Beech lumber, securely glued together under heavy hydraulic pressure. Accurately turned on centers. Protected on outside by cold shaped upset steel tires. Finished by a water-proofing process and painted any desired color.

Claims for broken heads end, when the use of Allen Wooden Heads begins.

Catalog showing our complete line gladly sent on request—ask for it.

ALLEN COMPANY, NEW BEDFORD, MASS.

Also Manufacturers of

Section Beams, Top Beams, Beam Trucks, Box Trucks, Braider Reels, and other wooden specialties

Southern Representative: Carolina Specialty Co., Charlotte, N. C.

ECLIPSE

AUTOMATIC STOP-MOTION DEVICE

for SPINNING and TWISTING

ITS simplicity and effectiveness is proved beyond doubt. The complete control of the spinning frame is placed in the hands of the operative. When an end breaks the stop-motion automatically covers the roving and instantly stops waste. It also operates when one or both bobbins are emptied, thus allowing all of the roving to run from bobbins. 90% saving is made in waste, not to speak of the labor saving and the prevention of mutilated bobbins.

At the Boston Textile Exposition the Eclipse Automatic Stop Motion was conceded to be one of the outstanding improvements of the industry.

It decreases broken ends, and produces a more even yarn. There is 95% perfect condition of rolls and a 75% saving in top roll covering.

Actual operating conditions prove that this perfect device makes these worth-while savings and furthermore saves 40% of labor cost of spinning, increasing the efficiency of spinning frame operatives wonderfully.

Let us send you full information. A line today will bring it promptly.

ECLIPSE TEXTILE DEVICES, Inc.

Elmira, N. Y.

Makers of

Automatic Yarn Cleaner
Automatic Stop Motion
Yarn Tension Device
Eclipse Van Ness Dyeing Machine

Uniform humidity everywhere is better than a number of moist spots

Carrier Air Washers and Buffalo Fans will supply properly conditioned air to ventilate your mill buildings.

This air will go to every part of building and not have its moisture localized above or away from where it is needed.

The unsurpassed efficiency of these washers, their low cost of erection, and of maintenance puts them above all competition.

Let us tell you more.

Carrier Air Conditioning Company of America

460 Broadway **Buffalo, N. Y.**

C-2

What it Means To the Textile Mill

The Baldwin Automatic Picker-Rod Lubricator means more to the textile mill today than any other modern improvement. It is designed to oil the picker rod automatically and after it is attached to the loom it requires no further attention other than refilling the container with oil. The Baldwin Automatic Picker-Rod Lubricator not only saves oil, time and labor, but it saves pickers, sticks, lug straps and bunters. It prolongs the life of the picker and rod. It prevents fire hazard caused from floor wastage of oil as it is leak proof.

The Baldwin is simple in construction and practically fool proof. It can be applied by anyone having the least mechanical knowledge. It will pay for itself in six months time in the savings of oil alone.

Write for full information of this automatic lubricator—let us prove to you how much it can save for you.

BALDWIN *Automatic* PICKER-ROD LUBRICATOR

The Baldwin Picker-Rod Lubricator Co.

Framingham, Mass.

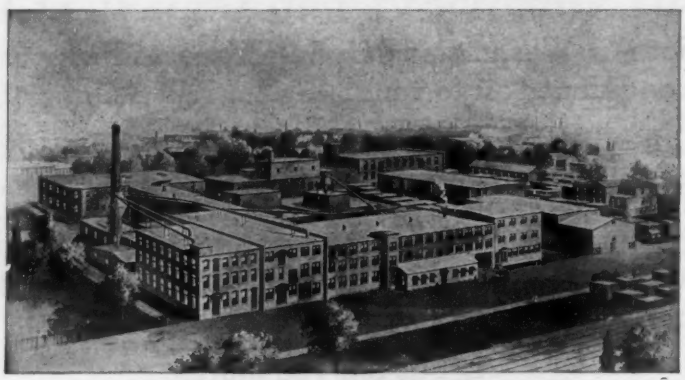
Bobbins Spools Skewers
Tubes Rolls
Manufacturers and Enamelers

OUR CUSTOMERS SAY

The careful attention that we give to the manufacture of their requirements means a stronger and more reliable Bobbin for them, while to us it means repeat orders.

We put all styles of reinforcements on Bobbins and Spools for conditioning of yarns.

All Bobbins enameled by our own process.



OUR PRODUCTS WHATEVER YOU USE WE MAKE

For service and prompt attention write us.

Walter L. Parker Co.
Lowell, Mass.

Keeping Faith With Mill Men

The makers of Williams' Shuttles feel a certain responsibility to the man who eventually uses their products. An eagerness to please is apparent in the thoroughness which characterizes these loom specialties.

In the first place, no shuttle block is used which does not come up to par. Seconds don't go. The fine points that make for perfect coordination—all these things are stressed. As a result the finished product is without an unharmonious note. It becomes an integral part of your looms. The user of Williams' Shuttles expects service and gets it.

Our staff of shuttle experts are ready to cooperate with mill men in determining their shuttle requirements. A request for samples incurs no obligation whatever.

The J. H. Williams Co.

"THE SHUTTLE PEOPLE"

MILLBURY MASS.

Southern Representative: GEORGE F. BAHAN, Charlotte, N. C.

SACO-LOWELL

LARGEST MANUFACTURERS OF TEXTILE MACHINERY IN AMERICA

SOUND MANUFACTURING PRINCIPLES ARE THE SAME FOR MANUFACTURING COTTON AND COTTON MILL MACHINERY

The ideal product for a cotton mill is one requiring no changes in yarn numbers from year to year. The mill with this sort of product, if well equipped and well managed, always has a lower operating cost and a better quality.

The Saco-Lowell Shops operate on this principle as nearly as possible.

The Kitson Plant builds only Opening and Picking Equipment. The Newton Plant builds only Cards, Drawing and Card Strippers. The Biddeford Plant builds only Roving and Spinning Frames. The Lowell Plant builds only Spoolers, Warpers, Twisters, Slashers and Flyers. The Pawtucket Plant builds only Twister and Spinning Rings.

Each plant is constantly competing with the others in improvements and quality of work. The Plants have so small a range of machines to manufacture, that they are in the same position as the cotton mill with no changes in yarn numbers.

SACO-LOWELL SHOPS

1824
No. 1 Federal St.
Boston, Mass.

Sales Offices
1220 Mint St.
Charlotte, N. C.

1924
Masonic Building
Greenville, S. C.

Smooth-

Did you ever try to stop a spool that had a splintered or broken head? Didn't make your hand feel good, did it? Many an operator has had his hand badly damaged by spools, and this is one of the reasons why they like the Smil-Bob—truly the last word in a smooth, troubleless, long-lasting spool.

The vulcanized fibre head will not crack, splinter, break or come off. It remains smooth and it always runs true, because of the perfect balance of the spool and durable precision of the spindle barrel.

Less spool replacement means less time and labor, not to speak of the enormous saving in yarn wastage due to broken heads and the increased traverse and yardage.

Don't accept substitutes, be sure they are genuine "Smil-Bob," made and backed by

L. C. SMITH BOBBIN WORKS
PHILLIPSBURG, N. J.

Exclusive Sales Representative: The Holburn-Thompson Co., Salem, Mass.

Southern Office: 201 Augusta St., Greenville, S. C., M. C. Sanders, Manager.

Northern and Export Office: 18 Goodhue St., Salem, Mass., C. R. Lee, Manager.

Indestructible

SMIL-BOB

Fibre Head SPOOLS

Shambow Shuttles Cost Less Than Ordinary Shuttles

When you figure the cost of a shuttle, you base your figuring on what it will do in the loom.

How much does a **"Smash"** Cost you?

How much does a stopped loom cost you per minute?

How much does a poor tip cost in the warp snips it causes?

How many yards of seconds do you produce?

A shuttle that contributes to these manufacturing costs is not cheap

No Matter What Price the Shuttle-Maker Quotes!

Shambow Quality is Obtainable Only in Shambow Shuttles

SHAMBOW SHUTTLE COMPANY

FACTORIES

WOONSOCKET, R. I.
John C. Shambow. Pres.

GREENVILLE, S. C.
H. H. Ulman, V. P. & G. M.

THE
WHITINSVILLE
SPINNING RING CO.
WHITINSVILLE, MASS.
SPINNING RING
SPECIALISTS
ESTABLISHED OVER FIFTY YEARS
DIAMOND FINISH

All Steel Loom and Section Beam Heads

Cannot Break
Do not Bend

"ALL STEEL" LOOM BEAM HEAD
"MALLEABLE" GEAR
PATENT PENDING

"ALL STEEL" SECTION BEAM HEAD
PATENTED

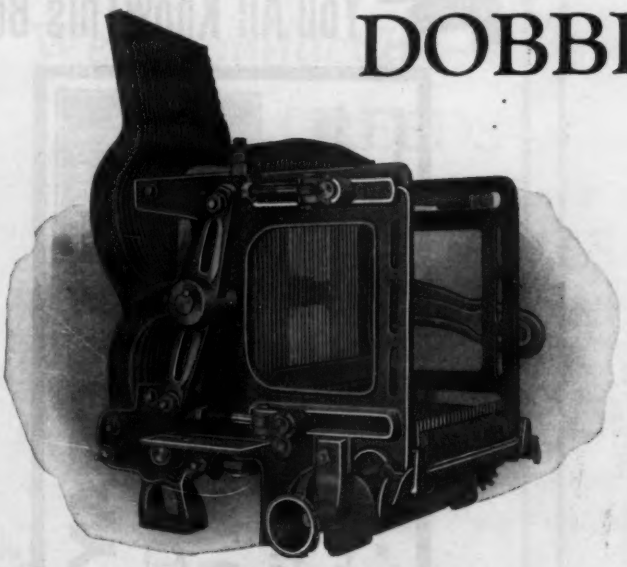
"ALL STEEL" ADJUSTABLE HEAD
SPLIT OR SOLID TYPE
PATENT PENDING

DUPLICATE YOUR CAST IRON HEAD IN STEEL—ELIMINATE ALL BREAKAGE
MAKE YOUR BEAM HEAD INVESTMENT PERMANENT

Mossberg Pressed Steel Corporation

Attleboro, Mass.

DOBBIES



Crompton & Knowles Double Index Dobby

We now equip dobbies of this type with pressed steel hook levers (patented) and drop forged top and bottom hooks (patented).

Slotted fingers and locking rod make it easy to remove, clean, and replace the fingers.

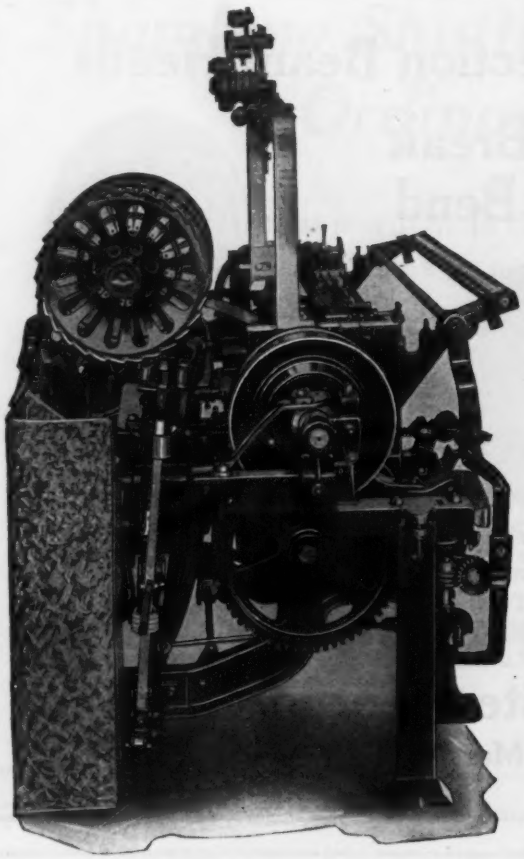
Crompton & Knowles Dobbies can be applied readily to any make or type of loom and will outwear any other dobbies on the market.

CROMPTON & KNOWLES LOOM WORKS

WORCESTER, MASS.

PROVIDENCE, R.I. PHILADELPHIA, PA. PATERSON, N. J.

S. B. ALEXANDER Southern Manager, Charlotte, N. C.



The Latest

NORDRAY

Automatic Loom

Multiple-harness, Feeler type

built by

HOPEDALE MANUFACTURING CO.

at MILFORD, MASS.

SOUTHERN OFFICE at
GREENVILLE, S. C.

This loom was shown at the Late Greenville Exposition and excited great interest.

It is Still the Simplest.

The Palmer Adjustable Thread Guide

For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

Patented and manufactured by

THE I. E. PALMER COMPANY

Middletown, - - - Connecticut

You All KnowThis Box

WHITIN MACHINE WORKS

ESTABLISHED 1831

TEXTILE MACHINERY

IMPROVED MODEL H WHITIN DRAWING FRAME

NEW WEIGHTING
NEW STOP MOTION
NEW GEARING
NARROWER WIDTH

EASY TO RUN AND ERECT
ASK FOR PARTICULARS

MAIN OFFICE AND WORKS

WHITINSVILLE, MASS., U.S.A.

SOUTHERN OFFICE CHARLOTTE N.C.

We Manufacture—

LOOM REEDS

Heavy Duck and Fancy Reeds a Specialty

HEDDLE FRAMES

With Sliding Hooks and Double Bars

Made with Iron or Wood Ends

TWIN STEEL WIRE HEDDLES

With or without Inserted Eyes

Samples and Prices Furnished on Request.

WALKER MANUFACTURING CO., INC.

ESTABLISHED 1875

Kensington Ave. and Ontario St., Philadelphia, Pa.

Southern Office: 201 Augusta St., Greenville, S. C.

"KORE-LOKT" PIN BOARDS
"STEEL-BILT" TRUCKS

Do You Condition Yarn?

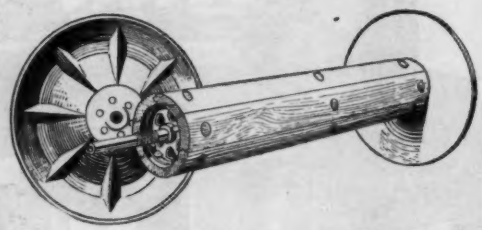
Steam-Proof "Kore-Lokt" Pin Boards

will not only save the labor of re-handling but will avoid the excessive spoilage traceable to oil, grease and chafing. They also eliminate the old fashioned filling boxes on the looms.

WASHBURN — IF IT'S ROLLS, WE MAKE THEM

NEW BEDFORD, MASSACHUSETTS

"ECONOMY" SECTION BEAMS



Patents Pending

THE LAST WORD IN BEAM CONSTRUCTION

No other beam on the market possesses the advantages of this improved type.

Interlocking, replaceable staves, removable shaft and all-metal interior construction spell *Real Economy.*

Furnished with or without heads.

WASHBURN — IF IT'S ROLLS, WE MAKE THEM

NEW BEDFORD, MASSACHUSETTS

Choose the SONOCO YARNSAVER

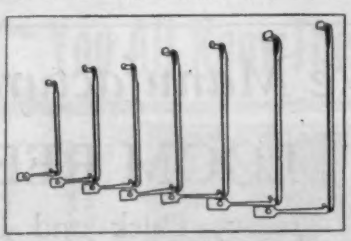
Either With or Without Cushion

Both have the burnished round nose that plays off the last lap of yarn without a hitch.

Sonoco Products Co., Mfrs., Hartsville, S. C.

CONES, PARALLEL TUBES, CLOTH-WINDING CORES

Eastern Office, 410 Olympia Bldg., New Bedford, Mass.
Canada: W. J. Westaway Co., Ltd , Hamilton, Ont.



It is not alone the design, nor the completeness of the line, that has built up a steady, increasing demand, during our twenty-five years of service to the Textile Industry, for our quality FLYER PRESSERS. It is the deep faith in their structural superiority—the feeling that they can be trusted in any mill—the knowledge that they will fit—will stand up—that the price is just right. All of which greatly increases the year's profits.

"Quality features built-in
—not talked-in."

Catalog and Prices on request.

Southern Spindle & Flyer Co., Inc.

"We Manufacture
Overhaul and Repair Cotton Mill Machinery"
Charlotte, N. C.

W. H. MONTY, Pres. and Treas. — W. H. HUTCHINS, V. Pres. and Secy.

Guaranteed Textile Brushes

PERKINS PRACTICAL BRUSH

ATLANTA BRUSH COMPANY

BRUSH UP FOR PROSPERITY

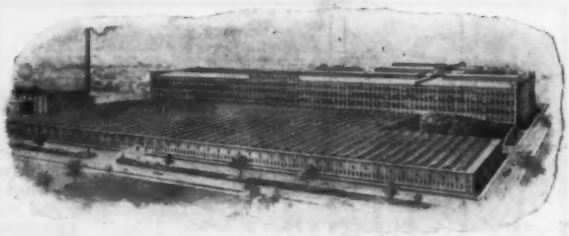
WITH

PERKINS PRACTICAL BRUSHES

ATLANTA BRUSH CO.
ATLANTA, GA.

ATLANTA BRUSH COMPANY

A Brush for Every Textile Need



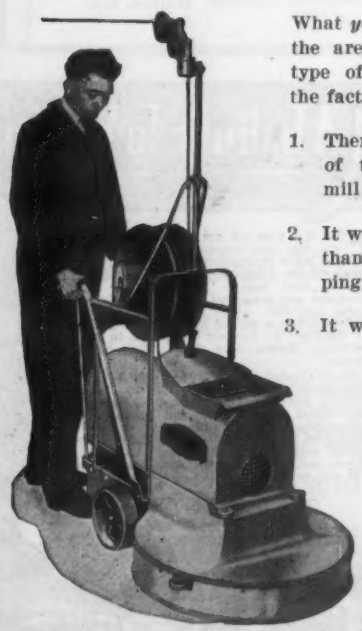
Nashawena Mills, New Bedford, Mass.

CLEAN FLOORS

At Less Cost

At the Nashawena Mills they *know* that the FINNELL System of Electric Scrubbing scrubs floors *clean* and keeps them *clean* with the least trouble and lowest cost.

More than three hundred other textile establishments use the FINNELL System. Hand scrubbing—even if done daily—is not satisfactory. If done well it is too costly. It is really as inefficient and out of date as hand spinning and hand weaving would be.



What *you* can save depends upon the area to be kept clean, the type of work, etc. These are the facts:

1. There is a FINNELL Outfit of the right size for your mill;
2. It will get your floors cleaner than hand scrubbing or mopping;
3. It will save time and labor.

Free Illustrated Folder

Also booklet "Electrical Scrubbing." Write for them now. One of our Scrubbing Engineers will be glad to show an interesting film right in your office if you wish. No obligation.

AMERICAN SCRUBBING EQUIPMENT SALES COMPANY

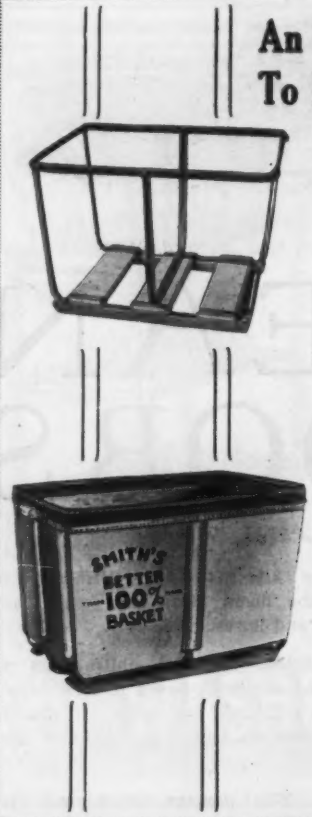
59 Collier St. **Hannibal, Mo.**

District Offices in Principal Cities.
Power Scrubbing Headquarters for 17 Years.

FINNELL SYSTEM

OF ELECTRIC SCRUBBING

"Clean Floors Reflect Clean Business"



An End To Basket Troubles

HERE is just the basket you have been looking for—a basket that puts an end to your basket troubles forever. One that will give you years of service.

SMITH'S

TRADE 100% MARK

BETTER BASKETS

have proven themselves worthy to hundreds of textile mills in durability and economy. The steel frame is indestructible high point carbon flat steel with rounded edges—fitted and clamped to hardwood skids with cross slats. Heavy canvas cover with leather reinforcements.

Order one or more today and be convinced.

Smith Mfg. Co.
Dalton, Ga.

MORE SOUTHERN SPINNERS are using

AMTEX
TRADE MARK REGISTERED

SPINNING, TWISTING AND SPOOLER TAPE

Than ever before

This increasing demand indicates the superiority of AMTEX Tapes over all others.

We are pleased to build special Tapes for your particular needs.

Send us your specifications and we will guarantee satisfaction.

Manufactured by

AMERICAN TEXTILE BANDING CO., INC.
GERMANTOWN, PHILADELPHIA, PA.
Sold in the South by
Charlotte Supply Co., Charlotte, N. C.
Wilson Company, Greenville, S. C.

Growth A Tribute To Worth
1883
1924
FOR the past 40 years the David Brown Co. has been known to hundreds of textile mills throughout the country as headquarters for "Superior" brand quality products. And today "High Grade" brand products are demanded wherever textile products are used. The reputation established 40 years ago is upheld today by the hundreds of workmen at the four big plants in Massachusetts, Maine, New Hampshire and Vermont.
"High Grade" products include: Plain and Automatic Loom Shuttles, Warp Bobbins, Filling Bobbins, Card Room Bobbins, Plain and Metal Head Warper and Twister Spools, Automatic Loom Bobbins, etc. Particular attention is called to our bobbins and spools fitted with our special metal shields of all kinds and types, and the metal enamel finish in any color.
THE DAVID BROWN CO.
"High Grade" Bobbins, Spools and Shuttles
LAWRENCE, MASS.
GOLD MEDAL
SILVER MEDAL
The David Brown Co.
Lawrence, Mass.

AMERICAN SUPPLY COMPANY

PROVIDENCE, R. I.

Manufacturers of

LOOM HARNESS,
WEAVING REEDS,
OAK TANNED LEATHER
BELTING, STRAPPING,
ETC.

We make a specialty of Harness for Warp Drawing Machines

Everyone Drinks

and everyone should drink sanitarily

When your workmen drink from R-S Vertico-Slant Sanitary Drinking Fountains, they drink collectively yet individually. Everyone drinks—and every one should drink sanitarily. The R-S Vertico-Slant feature assures that because *lips cannot touch the nozzle.* The slight slant stream prevents water from falling back upon the jet. Clear, fresh water flows and all drink without danger of contamination.

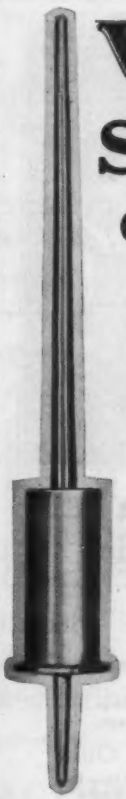
RUNDLE-SPENCE MFG. CO.
57 FOURTH ST. MILWAUKEE, WIS.

Write for new Catalog F which contains specifications, prices and complete information on all R-S Fountains. It will be gladly sent upon request.

R-S "Lips can't touch the R-S nozzle" R-S

WICACO SPINDLES

CUT YOUR COSTS

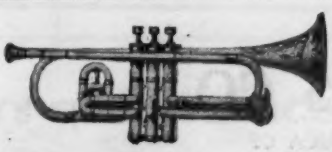


They stand straight at all speeds, holding bobbins in true alignment, thus maintaining high quality of product with evenness of twist, elasticity, and strength.

All Types and Sizes.

WICACO SPINDLES excel other spindles in rigidity and strength, enduring without permanent strain tests that make other spindles useless. Whirls are of one piece, unbreakable.

WICACO
SCREW & MACHINE WORKS, INC.
Stenton Avenue and Louden Street
Philadelphia, Pa.



A Band Helps to Make Contented Workmen

INDUSTRIAL bands are a great force for good—welding a body of employees together, inspiring loyalty, providing amusement and recreation and actually speeding up production.

Conn will Help You Organize

We've helped to organize and have equipped hundreds of bands—our experience is at your service, without obligation. Conn instruments, easy to blow, beautiful in tone, perfect in scale, reliable in action—ideal for beginners as well as professionals.

JOHN PHILIP SOUSA *uses and endorses Conn instruments.*

Write today to

C. G. CONN, LTD.
915 Conn Bldg., Elkhart, Ind.

HARDY BRUSHES

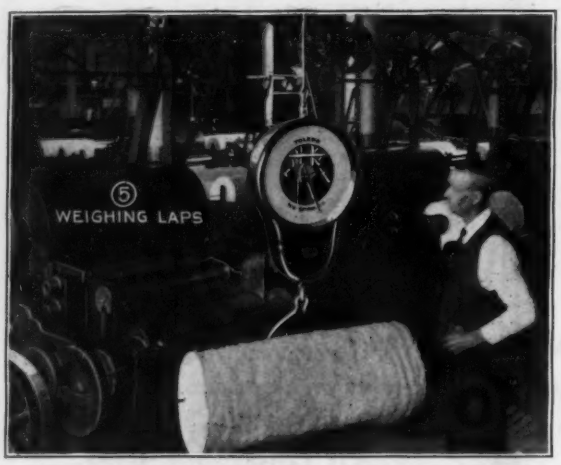
Textile Brushes of Every Description

We specialize on
Cotton Comber Rolls
for both Nasmith and Whitin Combs

Furnisher Brushes
for Cotton Printing.

Your inquiries will receive prompt attention and we will be pleased to quote and furnish samples.

FRANK H. HARDY, AGENT
Manufacturer of Brushes
ANDOVER, MASS.



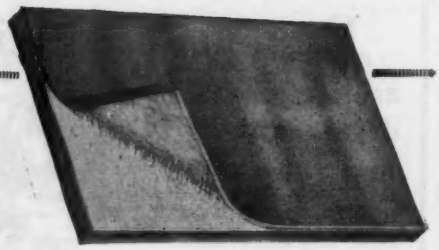
Automatic Scales

For Weighing or Checking

Raw Material
Sorts
Soap, Alkali and Dyes
Balls and Sliver
Test Pieces
Tops
Laps
Bobbins
Roving
Yarn
Yardage
Section Beams
Shipments
And for many other purposes.

Toledo Scale Company, Toledo, Ohio

Canadian Toledo Scale Co., Limited, Windsor, Ontario
Largest Automatic Scale Manufacturers in the World
106 Sales Rooms and Service Stations in the United States and Canada. Others in thirty-four foreign countries



A new material for mill trucks!

Why Haskins Veneered Steel is proving so successful

The photograph above shows a section of Haskins Veneered Steel. Note the outer strips which are made of galvanized steel, inclosing a wood core. A patented construction binds them closely together.

The Purpose of the steel
—is to make trucks which can ward off the severe blows encountered in daily mill use. It also provides a smooth surface which cannot injure or tear the most delicate of fabrics.

The Purpose of the wood
—is to keep the weight of the truck down so that it can easily be handled, and accurately guided about the mill.

The many years of service which Haskins Veneered Steel has given, fully justifies the claim that over ten years, without repairs, will be the average life of the new Haskins "Armord" trucks. Judging from the warm reception these trucks have already met with, they satisfy the real need which its owners recognized. Further data gladly sent on request.

R. G. HASKINS CO.
520 W. Monroe St.
Chicago Illinois

HASKINS "ARMORD" TRUCKS

Trucks that are "slam-bang proof"

ESTABLISHED 1849

GEO. W. HARRIS CO.

OLDEST MANUFACTURERS IN AMERICA OF

Loom Harnesses, Harness Twine and Mending Eyes

Our customers of 70 years ago are still our customers, and numbered among them are the largest mills in the world. The use of the highest grade materials, backed by 75 years of experience, assures products that will render the highest degree of efficiency and service. They are all guaranteed in every way.
We will be pleased to have a representative call on you and figure on your requirements for both prompt and future shipments.

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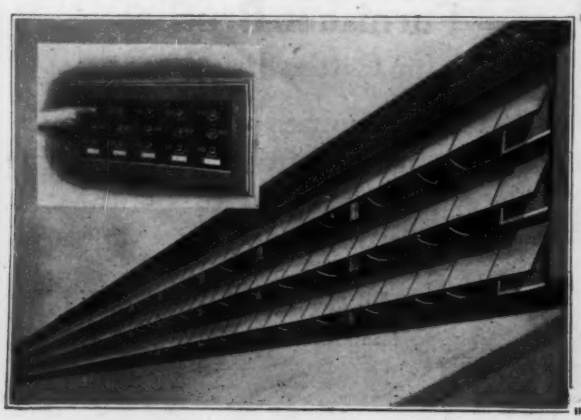

Callahan Sash Operators

HAND and electrically controlled for steel or wood sash in cotton mills, factories, warehouses, power houses, exhibition buildings, etc.

Callahan Sash Operators are neat in appearance,—positive in action—easy to install in either old or new buildings. Unusually long runs of sash are operated without variation in width of opening along the line.

Here is shown part of a Callahan Motor Drive installation. Two triple runs of top hung sash 150 ft. long and three multiple runs of center pivoted sash are operated from one central control panel.

Write for descriptive catalog and prices. Estimates gladly furnished from blueprints.

THE T. J. CALLAHAN CO.
804 South Perry Street Dayton, Ohio

Tough Tests for TUPELO

"THE HARD SOFT WOOD."

For a factory floor where the wear is **hard**
and continuous—

For a warehouse floor where the wear is **harder**
because of heavy loads coming and going—

For a platform, where the wear is **hardest**
with heavy truck wheels constantly rolling back and forth—

TUPELO "THE HARD-WEAR" LUMBER TUPELO "THE HARD-WEAR" LUMBER

stands the gaff, because of its tough, closely "knitted" or "involved" grain, which prevents it from "slivering" or "kicking" up.

TUPELO is good looking, too. Takes a fine finish.

Before placing an order for FLOORING for any use, write us and get the complete facts about TUPELO.

SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION
805 Poydras Bldg., New Orleans, La., or 805 Graham Bldg., Jacksonville, Fla.

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—and economy result from roofs applied by

"Dixie's Reliable Roofers"

because they know how to apply roofs in the most economical way that will give the longest wear and most satisfactory service.

If you have any roofing problems send them to us—we have experts who will help you solve them to your satisfaction. Call on us for quotations on

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Technical Paints
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"Good stuff goes in—good concrete comes out"

We can be of real service to builders who work with first class materials to produce first class jobs.

Arrowhead means washed Sand and Gravel — screened and sized in a modern plant to meet first class requirements. Let us send you strength tests, prices, etc. Write today!

4000 TONS A DAY

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Plant 4000 Tons Daily *Shepherd Bldg.*

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Approximately 1,500,000 Barrels "Royal Cement" Shipped Into Southeastern States Last Year

DIXIE PORTLAND CEMENT CO. ROYAL CHATTANOOGA, TENN.

Is tested in our laboratory every 60 minutes. The quality of our product is only equaled by our service in the handling of large jobs.

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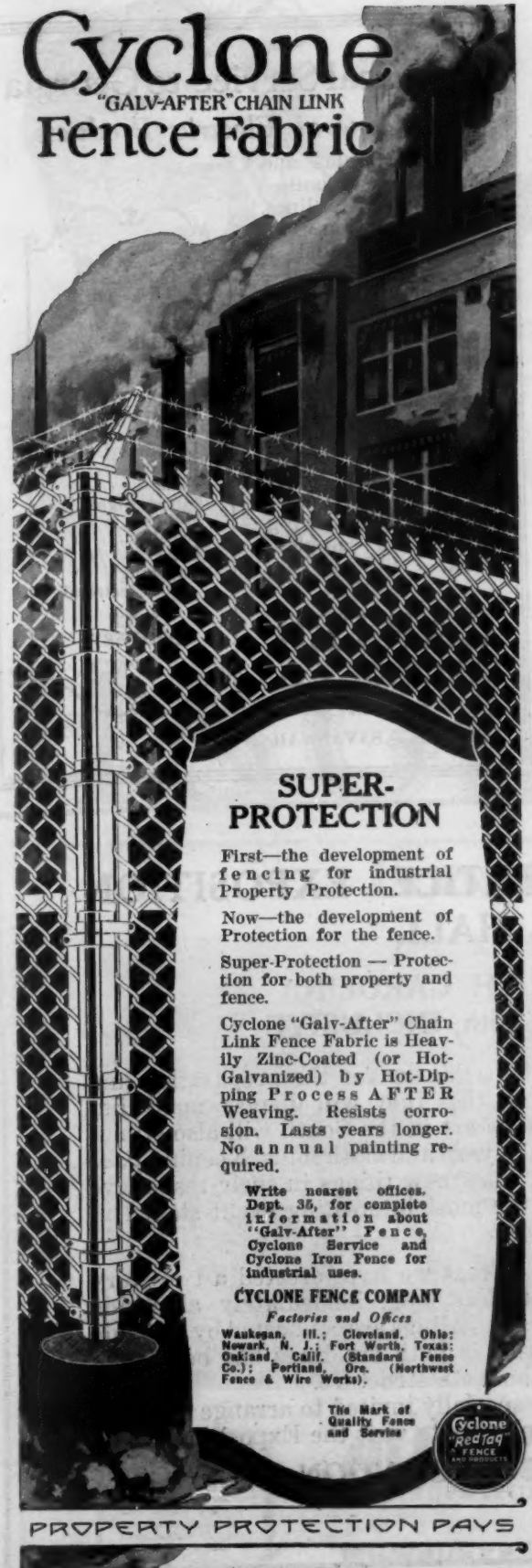
Cyclone

"GALV-AFTER" CHAIN LINK

Fence Fabric



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First—the development of fencing for industrial Property Protection.

Now—the development of Protection for the fence.

Super-Protection — Protection for both property and fence.

Cyclone "Galv-After" Chain Link Fence Fabric is Heavily Zinc-Coated (or Hot-Galvanized) by Hot-Dipping Process AFTER Weaving. Resists corrosion. Lasts years longer. No annual painting required.

Write nearest offices, Dept. 35, for complete information about "Galv-After" Fence, Cyclone Service and Cyclone Iron Fence for industrial uses.

CYCLONE FENCE COMPANY

Factories and Offices

Waukegan, Ill.; Cleveland, Ohio; Newark, N. J.; Fort Worth, Texas; Oakland, Calif. (Standard Fence Co.); Portland, Ore. (Northwest Fence & Wire Works).

The Mark of Quality Fence and Service

Cyclone "Red Tag" FENCE AND PRODUCTS

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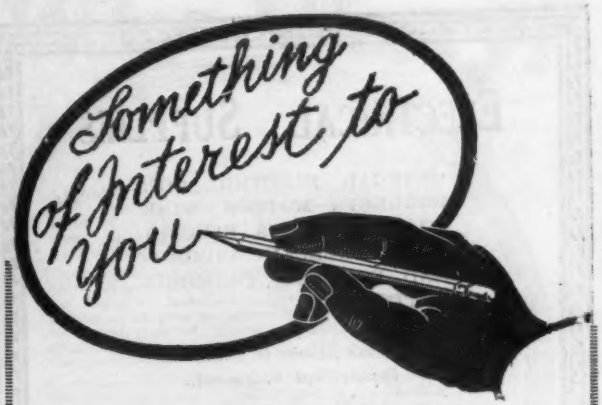

If you want to save on Paint—

Economy in the purchase of paint lies not only in the original cost per gallon paid for the paint, but in durability. By **durability**, we mean a paint that will **stay white** indefinitely, that will **stay** on the walls and ceilings when applied, a paint that will **not** peel, crack, chip, or blister, no matter how hot or cold may be the atmosphere, a paint that is impervious to acid fumes, water, gases, etc. That's exactly what we mean when we say ZEMCO-LITE is the DURABLE paint. ZEMCO-LITE properly fills every possible requirement that could be expected of a mill-white. Not only is ZEMCO-LITE the best mill-white, but it is the most economical.

Because of its base of pure white Portland Cement, ZEMCO-LITE is the last word in durability and economy. Mixed with water—just like cement.

Climatic conditions do not have the slightest effect on ZEMCO-LITE. Rain, sun, heat, cold, let them come, ZEMCO-LITE can hold its own.

ZEMCO-LITE is also prepared in colors for exterior painting of mill villages, for painting wood, iron, stucco, stone, brick, etc.

ZEMCO-LITE being a perfect non-conductor of heat, makes an excellent covering for steam pipes. It is the most economical means of minimizing losses from steam radiation.

Write for full data and color card.

AMERICAN CEMENT PAINT CO.

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Zemco-lite

TRADE MARK

The Cement Paint

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GENERAL ELECTRIC CO.'S PRODUCTS—MOTORS, WIRE, WIRING DEVICES, ELECTRICAL, PORCELAIN CONDUIT AND FITTINGS, TRUMBULL SWITCHES.

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Electrical Service to Georgia

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Our Atlanta and Savannah warehouses carry complete lines. Whatever your requirements — just so they are electrical— we can not only fill them, but insure prompt and efficient shipments.

We carry a particularly full line of textile mill equipment, illuminating units, lamps, motors, etc. Save yourself worry and inconvenience by drawing from our complete stock.

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CARTER ELECTRIC CO.

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ATLANTA SAVANNAH

SIXTH SOUTHERN TEXTILE EXPOSITION TEXTILE HALL

GREENVILLE, SOUTH CAROLINA OCTOBER 20th TO 25th, INCLUSIVE

We are assured by manufacturers of machinery for the preparation and spinning of cotton and by makers of looms, that they will display many improvements. The development of the textile art in the South will also stimulate the exhibition of new devices for use in yarn and cloth mills. Keeping pace with these the makers of accessories will show new things in their respective lines. Altogether the Exposition will be the most interesting event staged in Textile Hall.

So great has been the demand for space that we have erected a two-story building, sixty feet wide and two hundred feet long, immediately alongside Textile Hall and within twenty feet. These buildings are connected by six wide galleries, three on each floor. All of the space in both buildings has been sold, except a few sections in the balcony of the main structure.

The executives of Southern mills are especially invited to arrange for their superintendents, overseers and other employees to visit the Exposition.

TEXTILE HALL CORPORATION

Why Worry?

WHY should a textile executive bother his head about electrical problems? He cannot be expected to know all the best equipment and designs for efficient power and lighting systems for his mill.

The up-to-date textile executive calls in an electrical expert when he wants facts and figures for electrical installations for his new mill or addition—because he knows it must be installed with the view of future expansion—maximum efficiency on the investment, and dependable, uninterrupted service.

H & G. Trouble-Proof electrical installations, the result of years of experience in textile mill electrical problems, give you all of this, plus economy on initial investment.

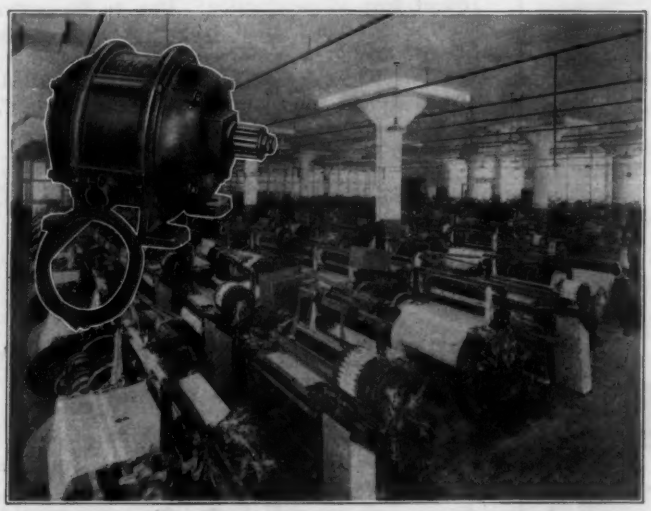
No matter how large or small your installations may be, the H & G engineers can solve them with the highest degree of efficiency and economy.

HUNTINGTON & GUERRY, INC.
GREENVILLE, S. C.

HUNTINGTON & GUERRY TROUBLE PROOF ELECTRICAL INSTALLATIONS

H & G TROUBLE-PROOF ELECTRICAL INSTALLATIONS

Loom Motors



An installation of 160—½ H. P. Loom Motors in a Southern Cotton Mill

Allis-Chalmers Loom Motors for individual drive are designed especially for this class of service.

They are totally enclosed, thereby eliminating any trouble for dirt or lint getting into the motor; equipped with waste packed bearings, minimizing the required attention; have tapered shaft for the ready mounting and dismounting of pinions and are arranged for conduit connections.

Send for Textile Bulletin

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
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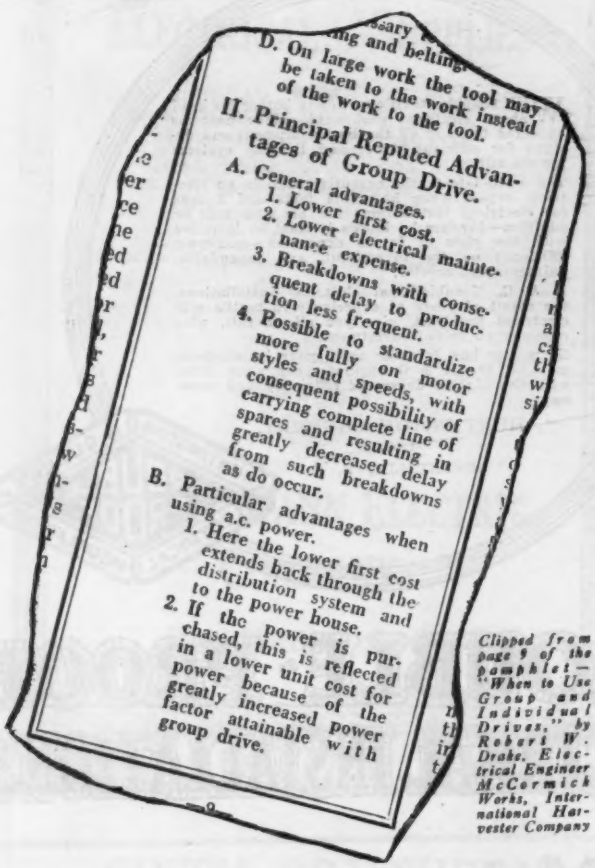
LEATHER LASTS LONGER



D. On large work the tool may be taken to the work instead of the work to the tool.

II. Principal Reputed Advantages of Group Drive.

A. General advantages.
1. Lower first cost.
2. Lower electrical maintenance expense.
3. Breakdowns with consequent delay to production less frequent.
4. Possible to standardize more fully on motor styles and speeds, with consequent possibility of carrying complete line of spares and resulting in greatly decreased delay from such breakdowns as do occur.

B. Particular advantages when using a.c. power.
1. Here the lower first cost extends back through the distribution system and to the power house.
2. If the power is purchased, this is reflected in a lower unit cost for power because of the greatly increased power factor attainable with group drive.

Clipped from page 9 of the pamphlet—"When to Use Group and Individual Drives," by Robert W. Drake, Electrical Engineer McCormick Works, International Harvester Company

THE pamphlet from which the above clipping was taken should be in the working library of every plant owner, engineer, plant superintendent and purchasing agent whose objective is increased production, lower operating and maintenance costs, decreased power losses, and reduction of wear and tear on belting and equipment.

Mr. Drake's articles form a welcome addition to a subject upon which very little authoritative data has been available.

Send today for a copy of the pamphlet containing them. It is FREE—Perhaps Mr. Drake has solved your drive problem.

LEATHER BELTING EXCHANGE, PHILADELPHIA, PA.

Nothing takes the place of

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LEATHER BELTING EXCHANGE,
417 Forrest Building, Philadelphia, Pa.

Send me a copy of the pamphlet containing the articles by Mr. Robert W. Drake.

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NEW! Steel Link V-Belt

for "The Reeves"

VARIABLE SPEED
TRANSMISSION

"THE REEVES" STEEL LINK V-BELT, applied to "THE REEVES" Variable Speed Transmission, represents the most important and revolutionary improvement ever brought forth for a variable speed transmission.

This belt is, first of all, practically unbreakable. It eliminates any chance of shutdown and consequent loss of production. Due to the extreme flexibility of this silent, true running belt, higher speeds and greater horsepower can be obtained. The steel belt is easily and quickly installed on Transmission—no tools whatever are required. It is self cleansing and only semi-occasionally requires a few drops of oil.

This new steel link V-belt may be installed on any REEVES Transmission now in service.

Write today for bulletin C-3030, for complete information on new steel V-belt.

REEVES PULLEY COMPANY

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Detroit Office: 135 High Street, West

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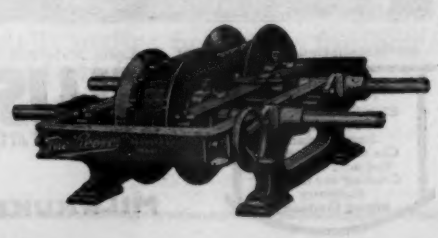


They never fail to back our claims

We claim that the Moccasin Bushing is the most reliable equipment you can install in your Textile Machinery, in loose pulleys or in any other bearing that has proved troublesome.

The Moccasin requires oiling but a few times *yearly*. It supplies clean, filtered oil to the bearing surfaces.

It minimizes friction and lasts indefinitely.

There is no waste—no dripping of oil to damage floors, belting or stock.

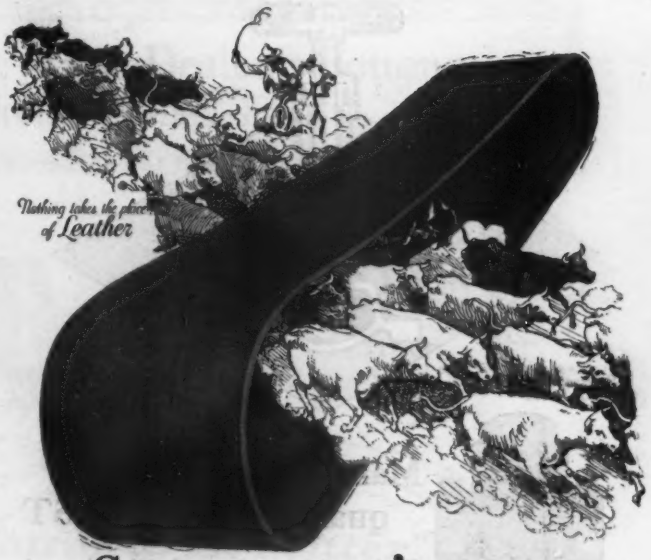
These are our claims and

Moccasin Bushings

have backed them up to the letter, as any of the following manufacturers will testify.

Anchor Duck Mills	Rome, Ga.
Avondale Mills	Birmingham, Ala.
Anthony Company, Bryan W.	Fall River, Mass.
Bibb Mfg. Company	Macon, Ga.
Brogan Mills	Anderson, S. C.
Butler Mills	New Bedford, Mass.
Columbia Textile Company	Lowell, Mass.
Crown Cotton Mills	Dalton, Ga.
Crystal Springs Bleachery Co.	Chickamauga, Ga.
Dallas Mfg. Co., The	Huntsville, Ala.
Dixie Spinning Mills	Chattanooga, Tenn.
Dixie Mercerizing Co.	Chattanooga, Tenn.
Dorranceton Silk Works	Kingston, Pa.
Dwight Mfg. Company	Alabama City, Ala.
Eagle & Phoenix Mills	Columbus, Ga.
Elk Cotton Mills	Dalton, Ga.
Erwin Cotton Mills	West Durham, N. C.
Flint Mills	Fall River, Mass.
Fulton Bag & Cotton Mills	Atlanta, Ga.
Hillside Cotton Mills	LaGrange, Ga.
Hillsborough Mills	Wilton, N. H.
Home Cotton Mills	St. Louis, Mo.
Jenckes Spinning Co.	Pawtucket, R. I.
Lullwater Mfg. Co., The	Thomson, Ga.
Manville-Jencks Co.	Pawtucket, R. I.
Massachusetts Mills	Lindale, Ga.
Massachusetts Mills	Lowell, Mass.
New England Southern Mills	LaGrange, Ga.
Peerless Cotton Mills	Thomaston, Ga.
Quissett Mills	New Bedford, Mass.
Richmond Hosiery Mills	Rossville, Ga.
Riverside and Dan River Cotton Mills	Danville, Va.
Standard-Coosa-Thacher Co.	Chattanooga, Tenn.
Shawmut Mills	Shawmut, Ala.
Spartan Mills	Spartanburg, S. C.
Thomaston Cotton Mills	Thomaston, Ga.
Trion Co., The	Trion, Ga.
United Hosiery Mills Corp.	Chattanooga, Tenn.
Unity Cotton Mills	LaGrange, Ga.
Victor-Monaghan Mills	Greer, S. C.
West Point Mfg. Co.	West Point, Ga.
Willingham Cotton Mills	Macon, Ga.

MOCCASIN BUSHING CO.
CHATTANOOGA, TENN.



Steers won't grow according to specifications

STEERS furnish hides "as is." Thick hides. Thin hides. Tough ones. Weak ones.

Yet despite this difference, the Graton & Knight Standardized Series guarantees you belts absolutely uniform in quality and service. The right belt for the right job.

How can this standard quality be so rigidly upheld? Only by keeping thousands upon thousands of hides in storage. Summer hides only—for they are best for belting use. Hides from our own great West—Europe—South America. Every market that yields the finest hides for different types of belts.

From this enormous stock the hides are carefully selected and held to exacting standards. Picked so two belts of any Standardized Series brand are always exact duplicates in quality of service.

You've never seen finer leather than is put into Graton & Knight Standardized Series belts. Leather that clutches the pulley without shaft-twisting, machine-wearing tension. Leather that wears.

Write for booklet 101-O, which gives full information about Standardized Series belts for textile mills.

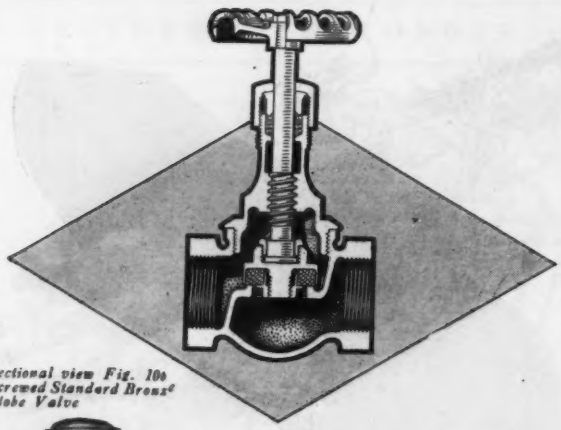
THE GRATON & KNIGHT MFG. CO.
Tanners—Makers of Belts and Other Leather Products
Worcester, Mass.

GRATON KNIGHT

Check this list of Graton & Knight products for informative booklets on the subjects which interest you.

Flat Belt	Lace Leather	Whole Leathers
Round Belt	Leather Packings	Cements
Fan Belts	Leather Strips	Preservatives

GRATON & KNIGHT
Standardized
LEATHER BELTING



Sectional view Fig. 106 Screwed Standard Bronze Globe Valve

Fig. 352, Screwed Standard Bronze Horizontal Swing Check Valve.

Fig. 143, Screwed, Standard Iron Body Angle Valve with yoke.

Fig. 331, Flanged, Standard Iron Body Gate Valve, outside screw and yoke, rising spindle.

Many types, but one quality—the FINEST

Jenkins Valves come in a variety of types—globe, angle, cross, check, stop-check, gate valves, valves in iron, bronze, and steel, in standard, medium and extra heavy patterns, blow-off or Y valves, fire-line valves, radiator valves—in fact, valves for practically all requirements.

But they are supplied in only one quality—the FINEST.

Strict adherence to the highest commercial standards in the selection, purchase and testing of raw materials, in the supervision of the workmanship and fabrication of the product, a correct appreciation of valve requirements, and an earnest and continual endeavor to make valves that users can depend on—all these have ever been the policies of Jenkins Bros. since Jenkins Valves were first made sixty years ago, in 1864.

And the same policies will be adhered to in the years to come.

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Merit Plus Recognition

"The heights by great men reached and kept were not attained by sudden flight."

Time, skill and effort must also precede merit as surely in machinery as in men.

Time, skill and effort must also precede merit in order to obtain and maintain for merit the recognition it deserves.

The great number of large installations of Cresson-Morris Power Transmitting Machinery is proof of both the merit and the recognition of the merit that nearly three score years of skill and effort have endowed it with.

The cumulative knowledge of all this experience is always available to you in the recommendations of our engineers.

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Stretched Laps Make Poor Work

And with ordinary rollers in the lap heads on lappers, the lap rod is so hard to turn that the lap is stretched by pulling hard enough on it to cause it to turn. Ball bearing rollers can be put in your present heads in a few minutes at small cost. Send us an order, giving the kind of lap heads you are now using.

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Ball WorkS Bearings

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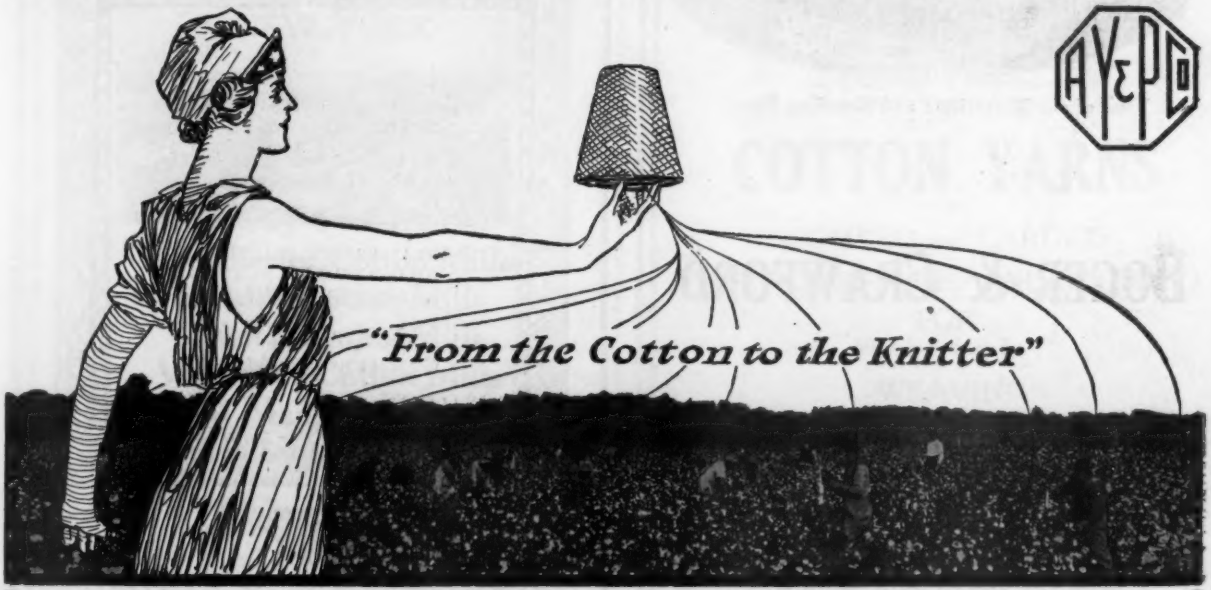
Commission Merchants, Yarn Dealers, Cotton Dealers and Brokers, Banks, Etc.



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SPINNERS AND MERCERIZERS

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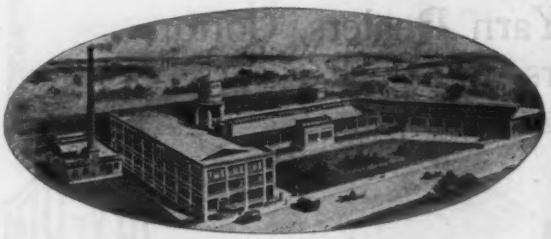

View of our Mercerizing and Bleaching Plant

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Spinners, Bleachers, Dyers and Mercerizers of High Grade Combed Yarns

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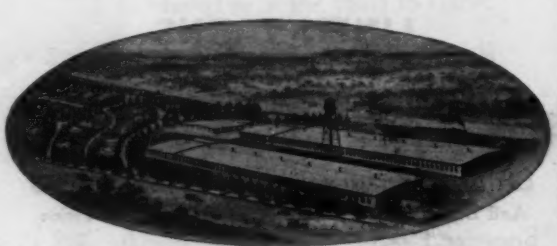
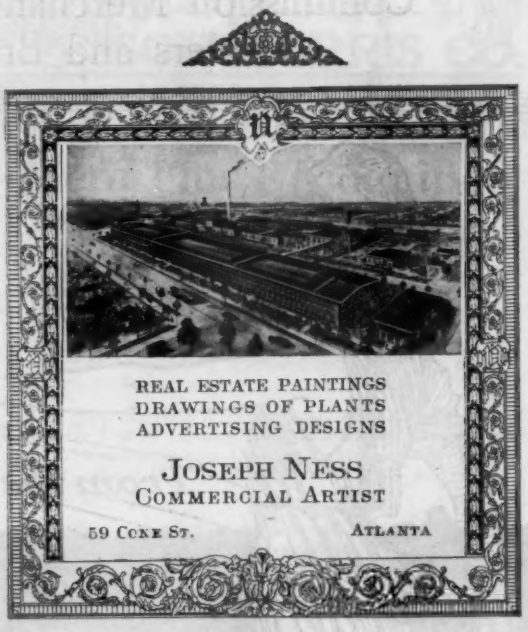


Spinning Mills, Lincolnton, N. C.



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E. W. MONTGOMERY, Pres. & Treas.
S. H. McKITTRICK, Sec'y.

Offices:
Greenville, S. C. Charlotte, N. C.

E. W. MONTGOMERY CO.

(INCORPORATED)

COTTON BROKERS AND MERCHANTS

Greenville, S. C.

Specializing in the Selecting of Cotton of Character and Staple for Particular Customers making a Product that bears the Stamp of Quality.

ESTABLISHED 1872

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J. William Barkdull
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PRIVATE WIRES TO NEW YORK, CHICAGO AND THROUGHOUT THE COTTON BELT

H. & B. BEER

325 BARONNE ST., NEW ORLEANS, LA.

Cotton — Grain — Stocks — Bonds
Provisions — Cotton Seed Oil —
Rice — Sugar and Coffee

MEMBERS OF

New Orleans Cotton Exchange
New York Cotton Exchange
New York Stock Exchange
New York Coffee & Sugar Exchange, Inc.
New York Produce Exchange
N. O. Future Brokers' Association
Chicago Board of Trade
La. Sugar and Rice Exchange
Associate Members of Liverpool Cotton Association
Associate Members of New York Curb Market Association

Write for Our Daily Cotton Market Letter.

ORDERS EXECUTED ON ABOVE EXCHANGES

Main Office: 325 Baronne St.
Branch Offices: 821 Gravier Street and Louisiana Sugar & Rice Exchange
PHONES MAIN 6272-6276

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"Positions Wanted" 3 cents per word per insertion. Minimum charge 50 cents. Payable in advance.

"Positions Open" and other undisplayed advertisements, 4 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(When replies are to be received in our care, allow four words for box address.)

The Troy Laundry Company recently purchased Real Estate and $100,000.00 worth of Sock Knitting machinery and dye works. Will sell for 10% cash and take balance in stock if this proposition is handled by responsible party. If interested write,

A. F. HYSON
C/O TROY LAUNDRY CO.
HAGERSTOWN, MD.

EXPORT REPRESENTATIVE

with over 20 years traveling experience through North Africa, Egypt, Sudan, Minor Asia, Persia, Turkey, Southeastern European states, desires connections with first-class Wool and Cotton Yarn Spinners. Mills for Bleached and Unbleached Cotton Goods, and Cotton and Bandages for Red Cross purposes. Best references. Address Box 204, care COTTON, Atlanta, Ga.

FOR SALE

One tandem compound Corliss steam engine, made by Robert Wetherill & Company. H.P. 850; cylinder diameters, high pressure 24½", low pressure, 44"; stroke 60"; fly wheel diameter 24 ft.; face 6 ft. 4 in., grooved for 1¾" rope; crank shaft 18"; Rpm. 60/70; excellent condition. Address ARMSTRONG CORK CO., Camden, N. J., Attention Mr. C. W. Russ.

FOR SALE

PATENT RIGHTS FOR "WALWORTH ROVING BOBBIN STRIPPER" WHICH COVERS STRIPPING BOBBINS BY ALL TRAVELING SURFACES. PATENTS GOOD UNTIL 1930. ADDRESS

G. WALWORTH,
BOX 65, GROVEVILLE, N. J.

Newand Second Hand

ENGINES

Corliss Automatic and Slide Valve

BOILERS

Pumps, Hoisting Engines, Gas and Gasoline Engines.

MACHINE TOOLS

Lathes, Planers, Shapers, Drill Presses, etc.

WOOD WORKING

Planers, Molders, Band Saws, etc.

ELEC. MACHINERY

Dynamos and Motors

AND SUPPLIES OF ALL KINDS

FRANK TOOMEY, Inc.,
127-31 N. Third St.,
Philadelphia, - Pennsylvania

Do You Want to Sell It?

Probably you, like many other mills, have some equipment which you have taken out, or are thinking of taking out and replacing with new equipment.

Why not dispose of this second-hand machinery at a profit? COTTON is read by thousands of Cotton Mills that are hardly touched by Northern journals.

You Can Sell Your Second-Hand Equipment to these mills through advertising in the Classified Advertising Section of COTTON. Such advertising produces results at small cost—why not try it out and get that second-hand equipment off your hands in a profitable way? Tell us what you have for sale and let us insert an advertisement for you.

COTTON
GRANT BUILDING ATLANTA, GA.

A LARGE STOCK OF EQUIPMENT

The Old Hickory Powder Plant offers a good opportunity to buy desirable slightly used equipment at low cost.

Cotton Drying Apparatus

20—No. 24, six-section 8' Sargent cotton dryers, with model "M" feeders.
20—48" Sargent cylindrical type mixing pickers.
20—48" Sargent special cotton washers or rinsers.
8—Noble & Wood concentrators.
31—Welded steel digesters, 1300 cu. ft. capacity.

Boilers

12—823 h.p. Babcock & Wilcox Stirling water tube boilers, 200 lbs. pressure, Class M-30, complete with Westinghouse stokers, forced draft fans, Vulcan soot blowers, and all accessories.
2—300 h.p. Heine boilers, 150 lbs. pressure. Murphy stokers and accessories.
2—500 h.p. Keeler boilers, Wetzel stokers. Also one self-supporting steel stack 11' x 200'.

Accumulators and Compressors

2—42 x 11½ x 50 Hydro Pneumatic Accumulators. Designed for 300 lbs. air service. Equipped with Watson-Stillman Automatic regulator.
4—15 and 26 x 20 x 24 Compound Duplex Laidlaw Compressors. Pressure 60 lbs. Capacity 2,570 cu. ft. at 150 r.p.m.

Blowers

1—160" Buffalo Steel Plate Induced Draft fan, three-quarter housing, designed to work against 1¾" static pressure at 450° F. Left hand type, overhung blast wheel, water cooled bearings.
2—120" Buffalo Steel Plate Induced Draft fans, three-quarter housing, designed to work against 1¾" static pressure at 450° F. Equipped with wedge adjusting water cooled bearings.
10—Connersville 26" x 36" horizontal top discharge gas blowers, capacity 24.5 cu. ft. per rev. at 4.58 lbs. per sq. in. at 255 r.p.m. Mounted on cast iron bed plate with double outboard bearing. Pulley 16" x 72".
8—24" Buffalo electric disc fans with single phase motors.
8—30" Buffalo electric disc fans with single phase motors.
2—No. 3 Root High Pressure Style D Blower, top discharge, with displacement of 2⅝ cu. ft. per revolution, single geared with double outboard bearings on bed plates, 30" x 8" driving pulleys. Max. pressure 10 lbs. per sq. in.

Corliss Engines

6—Allis-Chalmers 18" x 36" 350 h.p. Corliss Engines. Heavy duty mill type. Double eccentric. Crown face fly wheel 11 ft. diameter by 32 in. face. Complete with Richardson-Phenix oil filtration and lubricating system. Right and left hand types both available.

Condensers

2—No. 30 Schutte and Koerting Jet Condensers. Steam inlet 38", water inlet and outlet 14". Equipped with 4" Vacuum breaker. Designed to produce 24" mercury when condensing 33,000 lbs. of steam per hour with 3,000 g.p.m. condensing water at 92° F. at 9 lbs. pressure at condenser jets.
1—Ross surface condenser, size 200.

Feed Water Heaters

8—Patterson-Allen closed water heaters. Capacity 30,000,000 B.T.U. per hour or 470 gallons per minute. Size 44" diameter x 10'2" long.
4—Patterson-Allen closed water heaters. Capacity 8,000.000 B.T.U. per hour, or 126 gallons per minute. Size 24" diameter x 8'6" long.
3—Warren Webster open type, 11,000 B.H.P.

Steam and Oil Separators

3—Cochrane 8" extra heavy live steam separators.
1—Cochrane 24" oil separator.

Machine Tools

1—Rahn-Larmon 22"-30" x 14", series B, lathe.
1—32" x 14' Pittsburgh heavy pattern double back geared engine lathe.
1—16" x 6' American high duty lathe.
1—14" x 6' Hendy lathe.
1—1½" x 18" Pratt & Whitney turret lathe.
6—No. 5½ Sloan and Chase Bench lathes, 7" swing x 35" bed.
1—No. 2 Pratt & Whitney hand screw lathe.
1—250 lb. Chambersburg steam hammer.
1—125 lb. Belt-driven power Fairbanks hammer.
1—New Yankee Type B drill grinder, style "PO" point to grind drills, ⅛" to 2".
1—No. 4 Diamond wet tool grinder.
2—No. 61 Moline table type rail feed multiple drills.
1—5' Fosdick heavy duty radial drill.
1—3' American radial drill.
1—24" Hoefer back geared sliding head vertical drill.
10—Portable 2 shelf 24" x 20" tool stands with 1 drawer 16" x 7". Height overall 31½".
1—Pexto revolving hold all tool stand, No. 967.
1—No. 17 Bartlett Greenerd Arbor press, 25 ton capacity, 36" between housings.
1—36" x 28" x 10' Cincinnati planer.
1—16" Smith and Mills single gear shaper.
1—Royersford No. 3 double end punch and shear.
1—74" Newbold plate bending rolls.
1—No. 685 C.C. Hare's patent 4-leaf cornice brake, cap. No. 18 gauge iron or lighter, length 98".
1—No. 12 Higley cold metal saw.
1—John T. Burr No. 1 geared cold saw.
1—Champion Samson No. 1 tire bender, hand and power driven.
1—Tie straightener machine.
2—Fay & Egan No. 1 single spindle borers.
1—Newbold plate clamp 78" wide.
1—36" x 72" pipe bending and straightening table with holes.
1—60" x 72" Newbold bending and straightening table with holes 6" centers.
1—No. 11 Boston wire stitcher for wire mesh.
1—Wisconsin Universal Grinder No. 181.

Pipe Machines

1—4" Landis pipe cutting and threading machine. Equipped with 2½" to 4" head.
1—8" Landis pipe cutting and threading machine. Cuts 2½" to 8". Present equipment 6" to 8" head.
2—2" Landis pipe cutting and threading machines. Cut ½" to 2".
1—No. 9½ Eaton, Cole & Burnham pipe cutting and threading machines. Cuts 2½" to 4".
1—Murchey roller cutter, cuts ½" to 2", model E.
1—Murchey roller cutter, cuts 1½" to 4", model H.
1—1½" Landis single head combination belt and nipple threading machine. Equipped to thread bolts ½" to 1½" inclusive, and nipple ¼". Set No. 3 dies.
1—1¼" Foote Burt bolt threader.

Valves and Fittings

15—Carloads used valves and fittings from Old Hickory Powder Plant. Crane, Chapman and Walworth. Excellent condition. Almost anything you want in sizes 2" to 16", globe and gate.

Water Works Equipment

12—New Roberts filter tubs, 17 ft. dia. x 7 ft. depth, capacity each 454 gallons per minute.
48—Used tubs, same as above.
5—14" Class B Worthington double suction enclosed impeller (volute) centrifugal pumps, 16" suction, 14" discharge.
3—Allis-Chalmers 14" Type S Centrifugal pumps.
6—Allis-Chalmers 16" Type S Centrifugal pumps.
Write for Bulletin No. 22, Waterworks Equipment.

Electrical Equipment

We have recently issued Bulletin No. 21 Electrical Equipment, listing a large stock of motors, generators, transformers, condulets, panels, switches, circuit breakers, shades, reflectors and other equipment. Write for this Bulletin.

Steel Tanks

2—8' x 16' open top, hopper bottom, 1¼" plate. 2,750 gal.
30—20' x 12' Vertical Storage ¼"-⅛" plate, 28,200 gal.
29—9'6" x 9'6" Vertical agitated ⅝" plate, 5,120 gal.
40—8' x 6' Vertical bolted top, dished bottom, ⅜" plate, 2,340 gal.
28—8' x 30' Horizontal pressure (80 lbs.) ⅝" plate, 11,280 gal.
41—4'6" x 8' horizontal pressure (80 lbs.) ½" plate, 2,855 gal.
200—2'2¾" x 3'4" x 3' Vertical open with or without agitators. ⅜" plate, 165 gal.
Write for Bulletin No. 7, listing over 500 steel tanks.

Write for prices and specifications.

NASHVILLE INDUSTRIAL CORPORATION

OLD HICKORY, TENNESSEE

Buyers' Index

ACETYLENE GENERATING APPARATUS.
Oxweld Acetylene Co.

ACETYLENE WELDING APPARATUS.
(See Welding Apparatus.)

ACIDS.
(See Dyestuffs and Chemicals.)

ACCOUNTANTS.
Ernst & Ernst.

ACCOUNTING SYSTEMS.
Ernst & Ernst.

AERATING AND CLEANING MACHINE.
Murray Co., The.

AFTERCOOLERS AND REHEATERS (AIR).
Ingersoll-Rand Co.

AIR WASHERS.
Carrier Air Conditioning Co
Carrier Eng. Corp.
Parks-Cramer Co.

AIR COMPRESSORS.
(See Compressors.)

AIR CONDITIONING SYSTEMS
(See Humidifying Apparatus.)

ALBONE.
Roessler & Hasslacher Chemical Co.

ALKALIES.
(See Dyestuffs and Chemicals.)

ALUM.
(See Finishing and Sizing Materials.)

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(See Dyestuffs and Chemicals.)

ANTI-CHLORINE.
(See Dyestuffs and Chemicals.)

APPRAISAL SERVICE.
American Appraisal Co.

APRONS—RUB.
Bond Co., Chas.
Graton & Knight Mfg. Co.

ARCHITECTS AND ENGINEERS.
Lockwood, Greene & Co.
Robert & Co.
Stirrine, J. E.

ARMATURE REWINDING.
(See Repairing—Electrical.)

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Jacobs & Co.
Nunn, Joseph.

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(See Coal and Ash Handing Machinery.)

ASPHALT SLATE SHINGLES.
(See Slate Asphalt Roofing.)

AUDITORS AND ACCOUNTANTS.
Ernst & Ernst.

AUTO TRUCKS.
(See Trucks—Auto.)

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(See Temperature Regulators.)

AUTOMATIC LOOM ATTACHMENTS.
(See Loom Attachments.)

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Saco-Lowell Shops.
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Whitin Mch. Wks.

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White Co.

AWNINGS.
Smith Mfg. Co.

BABBITT METAL.
Ryerson & Son, Inc., Jos. T.

BACKWASHERS.
Sargent's Sons Corp., C. G.

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Smith Mfg. Co.

BAGS (COIN OR MONEY).
Smith Mfg. Co.

BAGS (COAL).
(Smith Mfg. Co.

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Aldrich Mch. Works.
Dodge Mfg. Co.
Fulton Supply Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Skayef Ball Bearing Co.
Strom Ball Bearing Mfg. Co.

BALL BEARING HOUSINGS.
Aldrich Machine Works.
Fafnir Bearing Co.
Fulton Supply Co.
Strom Ball Bearing Mfg. Co.

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(See Box Strappings & Buckles.)

BALE OPENERS.
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Logemann Bros.
Saco-Lowell Shops.

BALING PRESSES.
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Weimar Bros.

BANDAGE & TAPE MACHINES
Foster Machine Co.
Whitin Mch. Wks.

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(See Tapes.)

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American Trust Co.

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Ryerson & Son, Inc., Jos. T.

BAROMETERS.
Taylor Instrument Co.

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Smith Mfg. Co.

BASKETS—STEAMING—CANVAS.
Smith Mfg. Co.

BASKET—TRUCKS—CANVAS.
Smith Mfg. Co.

BASKETS—MILL—METAL.
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(See Storage Batteries.)

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Allen Co.
Mossberg Pressed Steel Corp.
U S Bobbin & Shuttle Co.

BEAM HEADS.
Allen Co.
Jordan Mfg. Co.
Mossberg Pressed Steel Corp.
U S Bobbin & Shuttle Co.

BEAMS (STEEL).
Ryerson & Son, Inc., Jos. T.

BEAMING AND WARPING MACHINERY.
(See Warpers and Warping Machinery.)

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Crosson-Morris Co.
Dodge Mfg. Co.
Fulton Supply Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Moccasin Bushing Co.
Skayef Ball Bearing Co.
Strom Ball Bearing Mfg. Co.
Wicaco Screw & Mch. Works, Inc.

BELTING (LEATHER, CANVAS AND RUBBER).
American Supply Co.
Bond Co., Chas.
Fulton Supply Co.
Graton & Knight Mfg. Co.
Leather Belting Exchange.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELTING—CHAIN.
Diamond Chain & Mfg. Co.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Morse Chain Co.

BELTING (ROUND—LEATHER).
Bond Co., Chas.
Graton & Knight Mfg. Co.
Leather Belting Exchange.
Rhoads & Sons, J .E.

BELTING—ROPE.
(See Rope Transmission.)

BELT CONVEYORS.
Dodge Mfg. Co.
Fulton Supply Co.
Link Belt Company.
Morse Chain Co.

BELT DRESSING.
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Dixon Crucible Co., Jos.
Fulton Bag & Cotton Mills.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT FASTENERS.
Detroit Belt Lacer Co.
Flexible Steel Lacing Co.
Fulton Supply Co.
Leather Belting Exchange.

BELT LACING (LEATHER).
Bond Co., Chas.
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Fulton Supply Co.
Graton & Knight Mfg. Co.
Leather Belting Exchange.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT TIGHTENERS.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Rhoads & Sons, J. E.

BENCHES MECHANICS' CLOTH ETC.
Allen Co.

BENCHES (PARK AND PLAYGROUND).
(See Playground Equipment.)

BILLIARD AND POOL TABLES AND EQUIPMENT.
Brunswick-Balke-Collender Co.

BIRDS EYE VIEWS AND DRAWINGS.
Nunn, Joseph.

BLEACHERIES.
(See Dyers, Bleachers and Finishers.)

BLEACHING KIERS.
Butterworth & Sons Co., H. W.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Machry. Co.

BLEACHING MACHINERY.
(See Dyeing, Bleaching and Finishing Machinery.)

BLEACHING, FINISHING AND SIZING MATERIALS.
(See Finishing Materials.)

BLOWERS AND BLOWER SYSTEMS.
Buffalo Forge Co.
Carrier Air Conditioning Co.
Carrier Eng. Corp.
General Electric Co.
Ingersoll-Rand Co.
Philadelphia Drying Mchry. Co.
Westinghouse Elec. & Mfg. Co.

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Oxweld Acetylene Co.

BOBBINS.
Brown Co., David.
Draper Corporation.
Fulton Supply Co.
Jordan Mfg. Co.
Lestershire Spool & Mfg. Co.
Parker Co., Walter L.
Shambow Shuttle Co.
Smith Bobbin Wks., L. C.
Textile Products Co.
U S Bobbin & Shuttle Co.
Whitin Machine Works.

BOBBIN HEADS.
Brown Co., David.
Jordan Mfg. Co.
Smith Bobbin Wks., L. C.
Textile Products Co.
U S Bobbin & Shuttle Co.

BOBBIN STRIPPERS.
Crompton & Knowles Loom Works.
Terrell Machine Co.

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Nashville Industrial Corp.
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Walsh & Weidner Boiler Co.

BOILER COMPOUNDS.
Dixon Crucible Co., Jos.

BOILER FEED WATER PURIFICATION.
Hungerford & Terry, Inc.

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Crane Co.
Dixon Crucible Co., Jos.
Fulton Supply Co.
Jenkins Bros.

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(See Banding Straps and Buckles.)

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Smith Mfg. Co.

BOXES—MILL—METAL.
Haskins Co., R. G.

BOXES—MILL—WOODEN.
Allen Co.

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(See Packing Boxes.)

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(See Tapes.)

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(See Welding.)

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(See Cotton Dealers & Brokers.)

BROKERS—STOCK.
(See Stocks and Bonds.)

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(See Brushes.)

BRUSHES—MILL.
Atlanta Brush Co.
Hardy, Frank H.

BRUSHES—MOTOR AND GENERATOR (COMMUTATOR).
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Haskins Co., R. G.
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BUCKETS—ELEVATOR AND GRAB.
Link-Belt Company.

BUCKLES—COTTON TIE.
(See Box Strapping and Ties.)

BUILDING CONTRACTORS.
(See Contractors.)

BUILDINGS (ALL STEEL).
Truscon Steel Co.

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Anchor Post Iron Works.
Birmingham Slag Co.
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Coolidge & Sons, F. J.
Detroit Graphite Co.
Dixie Portland Cement Co.
Dufur & Co.
Kirkpatrick Lumber & Timber Co.
Montgomery Gravel Co.
Murphy's Sons, C. P.
National Paving Brick Mfg. Asso.
Richardson Co.
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Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.
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Proctor & Schwartz, Inc.
Sargent's Sons, C. G.

BUSHINGS.
Moccasin Bushing Co.
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(See Consultants.)

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(See Lockers.)

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Butterworth & Sons Co., H. W.
Textile Finishing Mchry. Co.

CALENDER ROLLS.
(See Rolls—Calender.)

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Carter Electric Co.

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Smith Mfg. Co.

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(See Drying Equipment.)

CANS—ROVING
Haskins Co., R. G.

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(See Trucks.)

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Oxweld Acetylene Co.

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Oxweld Acetylene Co.

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Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons & Co., C. G.
Textile Finishing Mchry. Co.
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Whitin Machine Works.

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Gessner, David
Proctor & Schwartz, Inc.
Schofield Co., Wm.
Whitin Machine Co.

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Proctor & Schwartz, Inc.
Roy & Son, B. S.
Whitin Machine Works.

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Crompton & Knowles Loom Works.
Gessner, David
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Proctor & Schwartz, Inc.
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(See Aprons.)

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Crosson-Morris Co.
Lombard Fdry. & Mch. Co.
Piedmont Iron Works
Rome Machine & Fdry. Co.
Walsh & Weidner Boiler Co.

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Piedmont Iron Works.

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Make One Boiler Do the Work of Two

With the Morehead Back-to-Boiler System you can often double a boiler's efficiency. The system will return the condensation to your boilers as hot distilled feed water—saving fuel and cutting down repair expense.

The simple and compact system will enable you to do away with your extravagant and troublesome steam pumps or injectors. The Morehead system will feed your boilers positively and automatically. Repairs are seldom needed. Parts are quickly and easily replaced when necessary. Write us. Our engineers will work on your problems without obligation on your part.

Morehead Manufacturing Co.
Dept. C, Grand River Ave., at Warren
DETROIT, MICHIGAN
(133)

Morehead
"BACK-TO-BOILER-SYSTEM"
POSITIVELY DRAINS ALL TYPES OF STEAM APPARATUS DELIVERS CONDENSATION AND FEED WATER TO BOILERS UNDER ALL CONDITIONS AT MAXIMUM TEMPERATURE
(130)

BOILERS

of the

Water Tube and Tubular Types

OUR SPECIALTY

WALSH & WEIDNER BOILERS with our improved Steel Casing make the ideal Steam Plant. The cost of installation is moderate, the plant looks neat, cost of repairs is slight and they will save from 10 to 25% of your fuel bill.

We also manufacture Tanks of all description, Towers and Tanks, Steel Stacks, Steel Breeching, Smokestacks, Structural Steel and Plate Steel Work.

Write for our new catalog.

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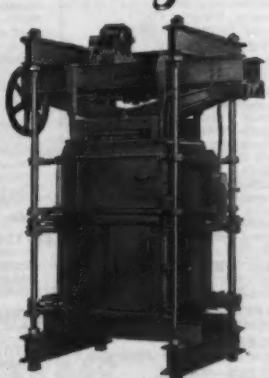
CHATTANOOGA, TENN.
New York Chicago San Francisco Memphis Havana
Kansas City Jacksonville New Orleans

LOGEMANN

Hand-Belt-Electric-Hydraulic

Baling — Presses



Model 26-MS. Power Baler specially designed for export yarn baling.

For Waste—
Hand-operated Balers—
Deep-box power Balers—
Hydraulic Balers—

For Finished Goods—
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Birmingham Slag Co.
Truscon Steel Co.

CEMENT AND BRICK COATING.
American Cement Paint Co.
Detroit Graphite Co.
Dixon Crucible Co., Jos.
Hockaday Co.
Sonneborn Sons, Inc., L.
Truscon Laboratories.
Wadsworth, Howland & Co., Inc.

CENTRAL STATION (ELECTRIC).
Tennessee Electric Power Co.

CENTRIFUGALS.
Cresson-Morris Co.
Fletcher Works.
Gould's Mfg. Co.
Schaum & Uhlinger.
Tolhurst Mch. Wks.

CHAIN DRIVES.
(See Belting—Chain Link.)

CHAIN—BLOCK, BICYCLE, AUTO, ENGINE, AGRICULTURAL, ETC.
Diamond Chain & Mfg. Co.
Fulton Supply Co.
Link Belt Co.
Morse Chain Co.

CHAIRS AND STOOLS.
(See Furniture—Mill.)

CHECK STRAPS.
Bond Co., Chas.
Fulton Supply Co.
Graton & Knight Mfg. Co.
Jacobs Mfg. Co., E. H.

CHEMICALS.
(See Dyestuffs and Chemicals.)

CHLORINE GAS.
Electro Bleaching Gas Co.
Mathieson Alkali Works, Inc.

CLEANING MACHINERY (CLOTH AND YARN).
Rome Mch. & Fdry. Co.

CLEANING AND AERATING MACHINE FOR COTTON.
Murray Company, The.

CLEARER CLOTH.
(See Cloth.)

CLOCKS—HANK, ETC.
(See Counters.)

CLOCKS (TIME).
Root Co.

CLOCKS—WATCHMAN.
Foxboro Co., Inc.
Root Co.

CLOSETS—WATER.
(See Toilets.)

CLOTH (ROLLER, CLEARER AND SLASHER).
Best & Co., Edw. H.
Phila. Felt Co.

CLOTH CUTTERS.
Firsching, J. A.
Foster Machine Co.
Wildman Mfg. Co.

CLOTH ROOM MACHINERY.
Butterworth & Sons Co., H. W.
Firsching, J. A.
Foster Machine Co.
Gessner, David
Hopedale Mfg. Co.
Saco-Lowell Shops.
Textile Finishing Mchry. Co.
Williams Co., J. H.
Wildman Mfg. Co.

CLOTH SHRINKING MACHINERY.
Gessner, David
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Tolhurst Mch. Wks.

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(See Winders.)

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Allis-Chalmers Mfg. Co.
Carlyle-Johnson Machine Co.
Cresson-Morris Co.
Fulton Supply Co.
Link-Belt Company.

CLUTCH LININGS.
Carlyle-Johnson Mch. Co.

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General Coal Co.

COAL AND ASH HANDLING MACHINERY.
Link-Belt Company.
Louden Machinery Co.

COAL TAR DISINFECTANTS.
(See Disinfectants.)

COCKS.
(See Valves.)

COMB APRONS.
(See Aprons.)

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Foster Machine Co.
Gessner, David
U S Bobbin & Shuttle Co.
Whitin Machine Wks.

COMMISSION MERCHANTS & DEALERS.
(See Cotton Cloth Commission Merchants.)

COMPRESS—COTTON.
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COMPRESSORS—AIR, GAS, ETC.
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Curtis Pneumatic Mchry. Co.
Fulton Supply Co.
General Electric Co.
Goulds Mfg. Co.
Ingersoll-Rand Co.

COMPRESSORS (AMMONIA).
Ingersoll-Rand Co.

COMPRESSORS (PORTABLE).
Ingersoll-Rand Co.

COMMUTATOR BRUSHES.
(See Brushes—Motor and Generator.)

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Birmingham Slag Co.

CONCRETE REINFORCING STEEL.
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Ingersoll-Rand Co.

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Emerson Apparatus Co.

CONDUITS.
(See Elec. Machinery & Supplies.)

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Sonoco Products Co.

CONE WINDING MACHINE.
(See Winding Machinery.)

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Westinghouse Elec. & Mfg. Co.

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Ernst & Ernst.

CONSULTING ENGINEERS.
(See Architects and Engineers)

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Sirrine & Co., J. E.
Truscon Steel Co.

CONTRACTORS—ELECTRICAL.
(See Electrical Engineers.)

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Williams, C. L.

CONTRACTORS (ROOFING).
Murphy's Sons, C. P.

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General Electric Co.
Taylor Instrument Co.

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(See Belt Conveyors.)

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Cresson-Morris Co.
Curtis Pneumatic Mchry. Co.
Elwell-Parker Elec. Co.
Fulton Supply Co.
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Louden Machinery Co.
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Morse Chain Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Schofield, Wm. Co.

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Mathews Conveyor Co.

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Mathews Conveyor Co.

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(See Humidifying Apparatus.)

COOLERS—WATER.
(See Water Coolers.)

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Buffalo Forge Co.
Carrier Air Conditioning Co.

COOLING TOWERS.
(See Tanks and Towers.)

COPPER STAMPS AND STENCILS.
(See Stamps, Stencils, etc.)

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Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

COPPING MACHINERY (SILK).
Eastwood, Benjamin.

CORPORATION FINANCE (TEXTILE).
American Trust Co.

CORRUGATED SHEET STEEL.
Ryerson & Co., Inc., Jos. T.

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Ernst & Ernst.

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COTTON FANS.
(See Blowers.)

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Meritzer, H. S.
Moss-McDuffe & Co.
Quissett Mill.
Tolar & Hart.
Weimar Bros.
Woodward, Baldwin & Co.

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Cooper & Griffin, Inc.
Montgomery Co., E. W.

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Battle-Ward Sales Co.
Brown Co., David.
Butterworth & Sons, H. W.
Chapman Electric Neutralizer Co.
Crompton & Knowles Loom Works.
Draper Corporation.
Eclipse Textile Devices, Inc.
Emerson Apparatus Co.
Firsching Co., J. A.
Fletcher Works.
Foster Machine Co.
Foxboro Co., Inc.
Fulton Supply Co.
Gessner, David
Graton & Knight Mfg. Co.
Harris Co., Geo. W.
Haskins Co., R. G.
Hopedale Mfg. Co.
Howard Bros. Mfg. Co.
Hunt Machine Co., Rodney.
Hyatt Roller Bearing Co.
Jacobs Mfg. Co., E. H.
Lestershire Spool Mfg. Co.
Lowell Crayon Co.
Mossberg Pressed Steel Corp.
Parker Co., Walter L.
Phila. Drying Mchry. Co.
Proctor & Schwartz, Inc.
Root Co.
Roy & Son, B. S.
Sargent's Sons Corp., C. G.
Saco-Lowell Shops.
Schaum & Uhlinger.
Schofield Co., Wm.
Shambow Shuttle Co.
Smith Bobbin Wrks., L. C.
Stafford Co.
Steel Heddle Mfg. Co.
Textile Products Co.
Terrell Machine Co.
Textile Finishing Machinery Co.
Toledo Scale Co.
Tolhurst Mch. Wks.
U S Bobbin & Shuttle Co.
Walker Mfg. Co.
Washburn & Sons, L. R.
Williams Co., J. H.
Whitin Machine Works.
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Fletcher Works.
Foster Mch. Co.
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(See Yarn Manufacturers.)

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Piedmont Bonded Warehouse & Compress Co.

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Root Co.

COUNTERS—RESTAURANT.
(See Restaurant Equipment.)

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(See Hoists.)

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CUTTERS—THREAD.
(See Thread Cutters.)

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(See Dyestuffs and Chemicals.)

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(See Scales.)

DIES—STEEL.
(See Stamps, Stencils, Etc.)

DIE STOCKS.
(See Pipe Threaders.)

DOBBY CHAINS.
Crompton & Knowles Loom Wks.
Whitin Machine Works.

DOBBY CARDS.
Jacobs & Co., E. H.

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(See Boxes—Mill.)

DOFFER FILLETS.
(See Fillets.)

DOFFING CARS.
(See Cars.)

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Ness, Joseph.

DRAWING FRAMES.
Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.

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Carter Electric Co.
Fulton Supply Co.
Perry-Mann Elec. Co.
Independent Pneumatic Mchry. Co.
Westinghouse Electric & Mfg. Co.

DRILLS—ROCK.
Ingersoll-Rand Co.

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(See Fountains—Drinking.)

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Mossberg Pressed Steel Corp.
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Rome Machine & Fdry. Co.

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Philadelphia Drying Mchry. Co.
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Butterworth, H. W., & Sons Co.
Gessner, David
Philadelphia Drying Mchry. Co.
Phila. Metal Drying Form Co.
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Tolhurst Machine Works.

DUST COLLECTORS.
(See Blowers and Blowing Systems.)

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Proctor & Schwartz, Inc.
Schofield & Sons, Wm.

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American Yarn & Processing Co.
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Franklin Process Co.
U. S. Finishing Co.

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Butterworth & Sons Co., H. W.
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Firsching, J. A.
Fletcher Works.
Franklin Process Co.
Fulton Co.
Gessner, David
Hightower Box & Tank Co.
Hungerford & Terry, Inc.
Hunt Machine Co., Rodney.
Klauder-Weldon Dyeing Mch. Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Schaum & Uhlinger.
Smith, Drum & Co.
Textile Finishing Machinery Co., The.
Tolhurst Machine Works.

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Franklin Process Co.

DYE BAGS OR NETS.
Smith Mfg. Co.

DYE STICKS.
Phila. Drying Machinery Co.

DYE VATS AND TUBS.
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Arabol Mfg. Co.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Bosson & Lane.
DuPont de Nemours & Co., E. I.
Ciba Co., Inc.
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Fleischmann Co., The.
Ford Co., J. B.
Grasselli Dyestuff Corp.
Kalt Mfg. Co.
Klipstein & Co., A
Lennig & Co., Chas.
Mathieson Alkali Works, Inc.
Metz & Co., H. A.
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Newport Chemical Wks.
New Brunswick Chemical Co.
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Rohm & Haas Co.
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Staley Mfg. Co., A. E.
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(See Electrical Machinery and Supplies.)

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(See Motors and Generators.)

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(See Fans—Electric.)

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(See Lamps.)

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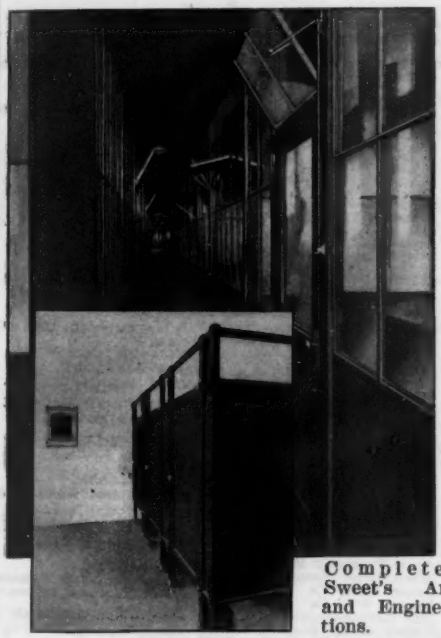

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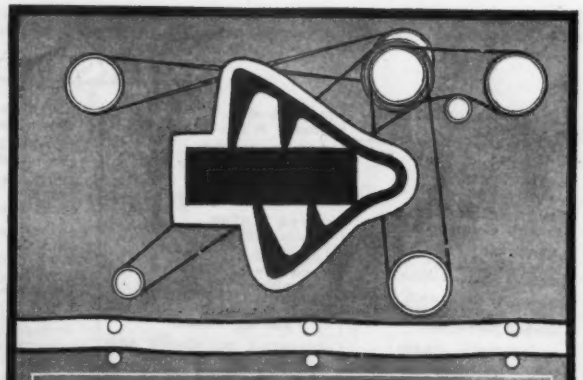

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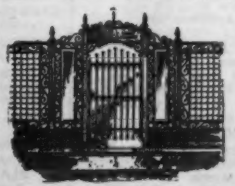

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Mathews Conveyer Co.

ELEVATORS.
Link-Belt Company.
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ENAMEL—MILL WHITE.
(See Paint.)

ENGINEERS—MILL.
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ENGINES—OIL, GAS AND GASOLINE.
Allis-Chalmers Mfg. Co.
Fulton Supply Co.
Ingersoll-Rand Co.

ENGINES (STEAM).
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American Blower Co.
Fulton Supply Co.
Ingersoll-Rand Co.
Lombard Iron Works & Supply Co.
Toomey, Frank.

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Jenkins Bros.
Lunkenheimer Co.
Mills & Lupton Supply Co.
Westinghouse Elec. & Mfg. Co.

ENGINEERS (CONSULTANT AND EFFICIENCY).
Ernst & Ernst.

ENGINEERS (MECHANICAL).
Bird-Potts & Co., Inc.

ENGRAVINGS AND CUTS.
Jacobs & Co.

ETCHING—PRINTING.
Jacobs & Co.

EXHAUSTERS.
(See Blowers.)

EXPORTERS—COTTON.
(See Brokers.)

EXTRACTORS—HYDRO.
American Laundry Mchry. Co.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Machine Works.

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(See Industrial Sites.)

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Buffalo Forge Co.
Carrier Air Conditioning Co.
Carter Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

FANS—CONVEYING, POWER AND EXHAUST.
(See Blowers and Blowing Systems.)

FASTENERS—BELT.
(See Belt Fasteners.)

FEED WATER PURIFIERS.
(See Boiler Feed Water Purifiers.)

FEEDERS.
(See Automatic Feeders.)

FELTING MACHINERY.
Proctor & Schwartz, Inc.

FENCE—STEEL AND IRON.
Anchor Post Iron Works.
Cyclone Fence Co.

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Southern Wood Preserving Co.

FENCE POSTS (STEEL AND IRON).
Anchor Post Iron Works.
Cyclone Fence Co.

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Howard Bros. Mfg. Co

FILLING—CAP AND WARP.
U S Bobbin & Shuttle Co.

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(See Theatre Equipment.)

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Bowser & Co., Inc., S. F.

FILTERS—WATER.
Hungerford & Terry, Inc.

FILTERS (ALUM).
Lennig & Co., Chas.

FILTER CLOTHS.
Smith Mfg. Co.

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(See Dyers, Bleachers and Finishers.)

FINISHING MACHINERY.
(See Dyeing, Bleaching and Finishing Machry.)

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Berne, Scrymser Co.
Bosson & Lane.
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Fleischman Co., The.
Ford Co., J. B.
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Keever Starch Co.
Klipstein & Co., A.
Lennig & Co., Chas.
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Newport Chemical Works.
New Brunswick Chemical Co.
Penick & Ford Sales Co., Inc.
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Rohm & Haas Co.
Sonneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Stein, Hall & Co.
United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

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FIRE HOSE.
(See Hose—Fire.)

FIRE PROTECTING PAINT.
(See Paint.)

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General Electric Co.
Perry-Mann Electric Co.
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(See Scrubbing Powders.)

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Truscon Laboratories.

FLOOR SWEEPS.
(See Brushes.)

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Howard & Bullough.
Proctor & Schwartz, Inc.
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Southern Spindle & Flyer Co.
Whitin Machine Works.

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Bird-Potts Co., Inc.
Oxweld Acetylene Co.

FLYERS.
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Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

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Foster Machine Co.

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(See Clutches—Friction.)

FURNITURE (FOLDING—CAMP).
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FURNITURE—MILL.
Mills Co.
Smith Mfg. Co.

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Fulton Supply Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.

GARNETT MACHINES.
Proctor & Schwartz, Inc.

GAS ENGINES.
(See Engines—Gas.)

GASOLINE LIGHTING SYSTEMS, LANTERNS, ETC.
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GASOLINE CAMP STOVES.
Smith Mfg. Co.

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(See Fence.)

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Taylor Instrument Co.

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Taylor Inst. Co.

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Fulton Supply Co.
General Electric Co.
Link-Belt Company.
Morse Chain Co.
Piedmont Iron Works

GEAR BLANKS.
Piedmont Iron Works.
Wicaco Screw & Mch. Wks., Inc.

GEAR CUTTING AND CUTTERS.
Cresson-Morris Co.
Piedmont Iron Works.

GEAR PULLERS.
General Electric Co.

GENERATORS—ELECTRIC.
(See Motors and Generators.)

GLOVES (ASBESTOS).
Oxweld Acetylene Co.

GOGGLES (WELDING).
Oxweld Acetylene Co.

GLASSWARE AND DISHES
(See Dishes.)

GOVERNORS—PUMP.
General Electric Co.

GRAPHIC CHARTS.
Ernst & Ernst.

GRAPHITE.
Detroit Graphite Co.
Dixon Crucible Co., Jos.

GRATES—BOILER.
Lombard Fdy. & Mch. Co.
Walsh & Weidner Boiler Co.

GRATES—MECHANICAL.
(See Stokers.)

GREASE.
(See Lubricants.)

GRAVEL.
Montgomery Gravel Co.

GRAVEL AND SLAG ROOFING.
Murphy's Sons, C. P.

GREASE CUPS.
(See Lubricators.)

GRINDER—CARD, CYLINDER ROLL, NAPPER AND GARNET.
(See Card Grinding Machinery.)

GAUGES (WELDING).
Oxweld Acetylene Co.

GUARDS—ELECTRIC LAMP.
(See Electric Lamp Guards.)

GUIDES—THREAD.
Mitchell-Bissell Co.
Palmer Co., I. E.

GUMS.
(See Finishing and Sizing Materials.)

HACK AND BAND SAWS AND BLADES.
Rentse Tool & Mch. Co.

HALFTONES—PRINTING.
Jacobs & Co.

HANGERS.
(See Shafting and Hangers.)

HANK CLOCKS.
(See Counters.)

HARNESS—LOOM.
(See Loom Harness.)

HARNESS TWINE.
Harris Co., Geo. W.

HEADS—BOBBIN AND SPOOL.
Lestershire Spool & Bobbin Co.
Parker Co., Walter L.
U S Bobbin & Shuttle Co.

HEATING AND VENTILATING APPARATUS.
(See Ventilating Apparatus.)

HEDDLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Howard Bros. Mfg. Co.
Steel Heddle Mfg. Co.
Walker Mfg. Co.
Williams Co., J. H.

HEDDLE FRAMES.
Crompton & Knowles Loom Works.
Gessner, David
Walker Mfg. Co.
Steel Heddle Mfg. Co.
Williams Co., J. H.

HOISTS.
Curtis Pneumatic Mchry. Co.
Elwell-Parker Electric Co.
Fulton Supply Co.
Ingersoll-Rand Co.
Link-Belt Company.
Louden Mchry. Co.
Morse Chain Co.

HOPPER FEEDERS.
(See Automatic Feeders.)

HORNS AND MUSICAL INSTRUMENTS.
Conn, Ltd., C. G.

HOSE (WELDING).
Oxweld Acetylene Co.

HOSIERY DYEING MACHINERY.
Franklin Process Co.
Philadelphia Drying Mchry. Co.

HOSIERY FORMS.
(See Drying Forms.)

HOSIERY YARNS.
(See Yarn Manufacturers.)

HOTELS.
Atlanta Biltmore Hotel.
Hotel Martinique.

HUMIDIFYING APPARATUS.
Carrier Air Conditioning Co.
Carrier Eng. Corp.
Parks-Cramer Co.

HUMIDIFYING INDICATING INSTRUMENTS.
Foxboro Co., Inc., The.
Taylor Instrument Co.

HUMIDITY RECORDERS.
Foxboro Co., Inc., The.

HYDGRODEIKS.
Tayor Instrument Co.

HYGROMETERS.
Foxboro Co.
Taylor Instrument Co.

HYDRAULIC TURBINES.
(See Turbines—Hydraulic.)

HYDRO EXTRACTORS.
(See Extractors.)

ILLUMINATING ENGINEERS.
Cooper Hewitt Electric Co.
Huntington & Guerry, Inc.

INDICATING AND RECORDING INSTRUMENTS AND THERMOMETERS.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Root Co.
Taylor Instrument Co.

INDIGO.
(See Dyestuffs and Chemicals.)

INDUSTRIAL SITES.
Charlotte Chamber of Commerce
Nashville Industrial Corp.
Southern Ry.
Tennessee Electric Power Co.

INK—STENCIL AND MARKING.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

IRON AND STEEL.
Ryerson & Son, Inc., Jos. T.

IRON WORK—ORNAMENTAL.
Cyclone Fence Co.
Dufur & Co.
Lombard Iron Works & Supply Co.
Piedmont Iron Works

JACK SPOOLS.
(See Spools.)

JACQUARDS.
Crompton & Knowles Loom Works.

JACQUARD HEDDLES.
Steel Heddle Mfg. Co.

JIGS.
Wicaco Screw & Mch. Wks., Inc.

JOINT COMPOUND.
Dixon Crucible Co., Jos.

JUTE BAGGING MACHINE.
Proctor & Schwartz, Inc.

KETTLES—SIZE.
(See Size Kettles.)

KETTLES—SODA.
Lombard Iron Works & Supply Co.

KIERS.
(See Bleaching Kiers.)

KNIT GOODS.
(See Cotton Cloth Commission Merchants and Dealers.)

KNIT GOODS WASHERS.
(See Washers—Cloth.)

KNITTING MACHINERY AND SUPPLIES.
Brinton Co., H.
Franklin Needle Co.
Granite State Needle Co.
Hemphill Mfg. Co.
Scott & Williams.
Torrington Co.
Standard Trump Bros. Mch. Co.
Wildman Mfg. Co.

KNITTING NEEDLES.
Franklin Needle Co.
Granite State Needle Co.
Torrington Co.

KNOTTERS.
Barber-Colman Co.

LABORATORY INSTRUMENTS.
Foxboro Co., Inc.
Root Co.
Taylor Instrument Co.

LACING—BELT.
(See Belt Lacing.)

LAMPS—INCANDESCENT AND ARC.
Carter Electric Co.
Cooper Hewitt Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

LAMP GUARDS—KEY LOCKING.
(See Electric Lamp Guards.)

LAMP REFLECTORS.
Carter Electric Co.
Cooper Hewitt Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

LANDSCAPE ARCHITECTS.
(See Village Architects.)

LAPPERS.
Saco-Lowell Shops.
Whitin Machine Works.

LATHES.
Fulton Supply Co.

LAUNDRY BAGS, BASKETS & NETS.
Smith Mfg. Co.

LAUNDRY MACHINERY.
American Laundry Mchry. Co.
Fletcher Works.
Gessner, David
Hunt Machine Co., Rodney.
Schaum & Uhlinger.
Tolhurst Machine Works.

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Bond Co., Chas.
Graton & Knight Mfg. Co.
Jacobs Mfg. Co., E. H.
Leather Belting Exchange.
Williams & Sons, I. B.

LIGHTS—FLOOD.
(See Flood Lights.)

LIGHTING ENGINEERS AND CONTRACTORS.
(See Illuminating Engineers.)

LINEN YARNS.
(See Yarns—Linen.)

LINK BELTING.
(See Belting—Link.)

LINTERS.
(See Waste Dealers.)

LIQUID CHLORINE.
(See Chlorine.)

LOADERS—WAGON AND TRUCK.
Link-Belt Company.

LOCKERS AND CABINETS.
Allen Company.
Mills Co.

LOGWOOD EXTRACT.
(See Dyestuffs and Chemicals.)

LOOMS.
Crompton & Knowles Loom Works.
Draper Corporation.
Fletcher Works.
Gessner, David
Hopedale Mfg. Co.
Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.

LOOM ATTACHMENTS—AUTOMATIC.
Baldwin Picker Rod Lubricator Co., Inc.
Draper Corporation.
Gessner, David
Hopedale Mfg. Co.

LOOM HARNESS.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Crompton & Knowles Loom Wks.
Emmons Loom Harness Co.
Garland Mfg. Co.
Harris Co., Geo. W.
Steel Heddle Mfg. Co.
Walker Mfg. Co.

LOOP PICKERS.
Jacobs Mfg. Co., E. H.

LUBRICANTS.
Dixon Crucible Co., Jos.
N. Y. & N. J. Lubricant Co.

LUBRICATORS.
Baldwin Picker Rod Lubricator Co., Inc.
Bowser & Co., S. F.
Carr Fastener Co.
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.
Walraven Co.

LUBRICATORS—PICKER ROD—AUTOMATIC.
Baldwin Picker Rod Lubricator Co., Inc.

LUBRICATING SYSTEMS.
Carr Fastener Co.
Walraven Co.

LUG STRAPS.
(See Straps—Lug.)

LUG STICKS.
Allen Co.

LUMBER.
Southern Cypress Mfg. Assn.
Southern Wood Preserving Co.

LUNCH ROOM EQUIPMENT.
(See Restaurant.)

MACHINE GUARDS.
(See Guards—Machine.)

MACHINE TOOLS.
(See Tools.)

MACHINISTS
Bird-Potts Co., Inc.
Briggs-Shaffner Co.
Cresson-Morris Co.
Lombard Fdry. & Mch. Wks.
Piedmont Iron Works.
Wicaco Screw & Mch. Wks., Inc.

MANIFOLDS.
Oxweld Acetylene Co.

MARKING POTS, STENCILS, INKS, ETC.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

MENDING EYES.
Harris Co., Geo. W.

MERCERIZED YARNS.
(See Yarn Manufacturers.)

MERCERIZERS.
Aberfoyle Mfg. Co.
Amer. Yarn & Processing Co.
Roger & Crawford.
Dixie Mercerizing Co.

MERCERIZED YARNS.
Aberfoyle Mfg. Co.
American Yarn & Pro. Co.
Roger & Crawford Co.
Dixie Mercerizing Co.
Hunter Mfg. & Comm. Co.

MERCERIZING MACHINERY.
Butterworth, H. W. & Sons Co.
Gessner, David
Smith, Drum & Co.
Textile Finishing Machinery Co.

METAL.
International Nickel Co.

METAL CEILINGS, ETC.
Truscon Steel Co.

METAL CUTTING MACHINES.
Racine Tool & Mch. Co.

METALS—PERFORATED.
(See Screens and Sieves.)

METERS—FLOW, AIR, GAS, ELECTRIC, STEAM, ETC.
Allis-Chalmers Mfg. Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

METERS—COUNTING.
(See Counters.)

MILL BASKETS AND BOXES.
(See Boxes—Mill.)

MILL ENGINEER.
(See Architects and Engineers.)

MILL VILLAGES.
(See Villages.)

MILL SUPPLIES—MISCELLANEOUS.
(See Supplies—Mill.)

MILL WHITE PAINT.
(See Paint.)

MOPS.
Atlanta Brush Co.

MOTION PICTURES.
(See Theatre Equipment.)

MOTORS AND GENERATORS—ELECTRIC.
Allis-Chalmers Mfg. Co.
Carter Electric Co.
Fulton Supply Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

MOVING PICTURE MCH. AND SUPPLIES.
(See Theatre Equipment.)

MUSICAL INSTRUMENTS.
Conn, Ltd., C. G.

NAPPER ROLL GRINDING MACHINES.
(See Card Grinders.)

NAPPING MACHINERY.
Saco-Lowell Shops.

NAPPER CLOTHING.
Howard Bros. Mfg. Co.

NEEDLES—KNITTING.
Franklin Needle Co.
Granite State Needle Co.
Torrington Co.

OFFICE EQUIPMENT & SUPPLIES.
Atlanta Stamp & Stencil Wks.
Jacobs & Co.

OFFICE PARTITIONS.
(See Partitions.)

OIL—LUBRICATING.
Johnson & Co., Inc., Oliver.
N. Y. & N. J. Lubricant Co.
Wadsworth, Howland & Co., Inc.

OIL ENGINES.
(See Engines Oil.)

OILS—FINISHING.
(See Finishing and Sizing Materials.)

OIL CUPS.
(See Lubricants.)

OIL PAPER.
Bradley Mfg. Co., A. J.

OIL PUMPS.
(See Pumps—Oil.)

OIL SEPARATORS.
(See Separators.)

OIL TANKS.
Bowser & Co., Inc., S. F.

OILING DEVICES.
(See Lubricators.)

OPENING MACHINERY—COTTON, WOOL, WASTE, ETC.
Murray Company, The.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

OVENS — CONDITIONING (Electric).
Emerson Apparatus Co.

OVERHEAD CARRIERS.
Curtis Pneumatic Mchry. Co.
Louden Mchry. Co.

OXIDIZING MACHINERY.
Phila. Drying Machinery Co.

OXY-ACETYLENE APPARATUS AND SUPPLIES.
Bird-Potts Co., Inc.
Fulton Supply Co.
Oxweld Acetylene Co.

OXYGEN.
Oxweld Acetylene Co.

PACKING BOXES AND CASES—WOODEN.
Hightower Box & Tank Co.

PACKINGS.
Jenkins Bros.

PAINT.

ENAMELS, VARNISHES, ETC.
American Cement Paint Co.
Coolidge & Sons, F. J.
Detroit Graphite Co.
Dixon Crucible Co., Jos.
Hockaday Co.
Johnson & Co., Oliver.
Sonneborn Sons, Inc., L.
Toch Brothers.
Truscon Laboratories.
Wadsworth, Howland & Co., Inc.
Warren Co.
Williams, C. L.

PAINT SPRAYING EQUIPMENT.
Wadsworth, Howland & Co., Inc.

PAINTING CONTRACTORS.
(See Contractors.)

PANEL BOARD.
(See Switchboards.)

PAPER.
Bradley Mfg. Co., A. J.

PARTITIONS—STEEL AND WIRE.
Cyclone Fence Co.
Mills Co.

PAVING BRICKS.
National Paving Brick Mfg Asso.

PERBORATE OF SODA.
Roessler & Hasslacher Chemical Co.

PERFORATED METAL.
(See Screens and Sieves.)

PEROXIDES.
Roessler & Hasslacher Chemical Co.

PICK COUNTERS.
(See Counters.)

PICKERS—CURLED HAIR.
Proctor & Schwartz, Inc.
Schofield Co., Wm.

PICKERS—LEATHER.
Bond Co., Chas.
Garland Mfg. Co.
Graton & Knight Mfg. Co.
Jacobs Mfg. Co., E. H.

PICKER LOOPS.
Jacobs Mfg. Co., E. H.

PICKER BAGS.
Smith Mfg. Co.

PICKER GEARS.
(See Gears.)

PICKER STICKS.
Garland Mfg. Co.

PICKING MACHINERY AND EQUIPMENT.
Gessner, David
Howard & Bullough Am. Machine Co.
Proctor & Schwartz, Inc.
Piedmont Iron Works.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

PIN BOARDS.
Washburn, Inc.

PINIONS.
General Electric Co.
Piedmont Iron Works.

PIPE—STEEL RIVETED.
Fulton Supply Co.
Youngstown Sheet & Tube Co.

PIPE AND PIPE FITTINGS.
Fulton Supply Co.
Lunkenheimer Co.
Parks-Cramer Co.

PIPE JOINT COMPOUND.
Dixon Crucible Co., Jos.
Fulton Supply Co.

PIPING—COTTON.
Youngstown Sheet & Tube Co.

PIPE BENDING.
Youngstown Sheet & Tube Co.

PLAYGROUND APPARATUS & EQUIPMENT.
Rundle-Spence Mfg. Co.

PNEUMATIC MACHINERY & TOOLS.
Curtis Pneumatic Mchry. Co.
Independent Pneumatic Tool Co.
Ingersoll-Rand Co.

PORCELAIN GUIDES.
Mitchell-Bissell Co.

PORTABLE HOUSES AND GARAGES (STEEL).
Dowman, George.

POSTS—FENCE (WOOD).
Southern Wood Preserving Co.

POWER—ELECTRIC.
Tennessee Electric Power Co.

POWER TRANSMISSION EQUIPMENT.
Aldrich Machine Works.
Allis-Chalmers Mfg. Co.
Bond Co., Chas.
Carlyle-Johnson Mch. Co.
Cresson-Morris Co.
Detroit Belt Lacer Co.
Diamond Chain & Mfg. Co.
Dixon Crucible Co., Jos.
Dodge Mfg. Co.
Fafnir Bearing Co.
Flexible Steel Lacing Co.
Fulton Supply Co.
General Electric Co.
Graton & Knight Mfg. Co.
Hyatt Roller Bearing Co.
Leather Belting Exchange.
Link-Belt Company.
Mills & Lupton Supply Co.
Mocassin Bushing Co.
Morse Chain Co.
Piedmont Iron Works.
Reeves Pulley Co.
Rhoads & Sons, J. E.
Skayef Ball Bearing Co.
Strom Ball Bearing Mfg. Co.
Westinghouse Elec. & Mfg. Co.
Wicaco Screw & Mch. Wks., Inc.
Williams & Sons, I. B.

PREHEATING APPARATUS.
Oxweld Acetylene Co.

PRESERVATIVE PAINT FOR METAL WORK.
(See Paints.)

PRESSES.
American Laundry Mchry. Co.
Butterworth & Sons Co., H. W.
Economy Baler Co.
Logemann Bros. Co.
Phila. Drying Mch. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Textile Finishing Machinery Co., The.

PRESSURE GAUGES.
(See Gauges.)

PRESSURE REGULATORS.
(See Regulators—Pressure.)

PRINTERS (CLOTH).
(See Dyers.)

PRINTING MACHINERY (CLOTH).
Gessner, David

PRINTING.
Jacobs & Co.
Showalter Printing Co., A. J.

PRINTING EXTRACTORS—HYDRO.
Tolhurst Machine Works.

PROPELLER FANS.
(See Blowers.)

PROPERTY BUYING AND SELLING (TEXTILE).
Battle-Ward Sales Co.

PSYCHROMETERS.
Foxboro Co., Inc., The.

PULLEYS.
Cresson-Morris Co.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Reeves Pulley Co.

PULLEY COVERING.
Reeves Pulley Co.
Williams & Sons, I. B.

PUMPS.
Allis-Chalmers Mfg. Co.
American Oil Pump & Tank Co.
Fulton Supply Co.
Goulds Mfg. Co.
Ingersoll-Rand Co.
Sydnor Pump & Well Co., Inc.
Toomey, Frank.
Walsh & Weidner Boiler Co., The.
Westinghouse Elec. & Mfg. Co.

PUMPS—OIL.
American Oil Pump & Tank Co.
Bowser & Co., S. F.
Ingersoll-Rand Co.
Lunkenheimer Co.

PUMP GOVERNORS.
Locke Regulator Co.

PUMP VALVES.
(See Valve Discs.)

PUMPING SYSTEMS (AIR LIFT).
Ingersoll-Rand Co.

PYROMETERS.
Foxboro Co.
Taylor Instrument Co.

QUILLS.
Jordan Mfg. Co.
U S Bobbin & Shuttle Co.

QUILL CLEANING MACHINES.
Terrell Machine Co.

RAILS (STEEL).
Eyerson & Son, Inc., Jos. T.

RAILROADS.
Southern Ry.

RECEIVERS (AIR).
Ingersoll-Rand Co.

RECEPTACLES—FIBRE.
(See Fibre Products.)

RECOVERING TOP FLATS.
Howard Bros. Mfg. Co.

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Bristol Co.
Foxboro Co., Inc.
General Electric Co.
Taylor Instrument Co.

REEDS AND REED WIRE.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Emmons Loom Harness Co.
Steel Heddle Mfg. Co.
Walker Mfg. Co.

REELS.
Allen Company.
Crompton & Knowles Loom Works.
Draper Corporation.
Hunt Machine Co., Rodney.
Mossberg Pressed Steel Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

REFLECTORS—LAMPS.
(See Lamp Reflectors.)

REGULATORS—LIQUID LEVEL.
Foxboro Co., Inc.
Fulton Co.
General Electric Co.

REGULATORS (COMPRESSED GAS).
Oxweld Acetylene Co.

REGULATORS—PRESSURE.
Foxboro Co., Inc., The.
Fulton Co.
General Electric Co.
Taylor Instrument Co.

REGULATORS—TEMPERATURE.
(See Temperature Controllers.)

REINFORCING SLAG.
Birmingham Slag Co.

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Briggs Shaffner Co.
Huntington & Guerry, Inc.
Southern Electrical Supply Co.
Westinghouse Elec. & Mfg. Co.

REPAIRING—TEXTILE MACHINERY, ETC.
Bird-Potts Co., Inc.
Briggs-Shaffner Co.
Piedmont Iron Works.
Southern Spindle & Flyer Co.

RIBBERS.
(See Knitting Machinery.)

RIB TOP CUTTERS.
Wildman Mfg. Co.

RINGS—PISTON
Wicaco Screw & Mch. Wks., Inc.

RINGS—SPINNING.
(See Spinning Rings.)

ROCKER SHAFT BEARINGS.
(See Bearings.)

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Oxweld Acetylene Co.

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(See Cloth.)

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Textile Finishing Mchry. Co.
U S Bobbin & Shuttle Co.
Washburn, Inc.

ROLLS—RUBBER COVERED.
Butterworth & Sons Co., H. W.
Textile Finishing Mchy. Co.
Stowe & Woodward Co.

ROLLS—STEEL.
Butterworth & Sons Co., H. W.
Southern Spindle & Flyer Co.
Textile Finishing Mchy. Co.
U S Bobbin & Shuttle Co.
Washburn, Inc.

ROLLS (WOODEN).
U S Bobbin & Shuttle Co.
Washburn, Inc.

ROOFING.
Cortright Metal Roofing Co.
Kirkpatrick Lumber & Timber Co.
Murphy's Sons, C. P.
Richardson Co.
Southern Wood Preserving Co.
U. S. Gypsum Co.
Wadsworth, Howland & Co.

ROOFERS.
Kirkpatrick Lumber & Timber Co.
Murphy's Sons, C. P.

ROOFS WATERPROOFED AND INSULATED.
Murphy's Sons, C. P.

ROOFING AUXILIARIES (PIPE GUTTERS—EAVE TROUGH ETC.)
Kirkpatrick Lumber & Timber Co.

ROOF AND CEMENT COATING.
American Cement Paint Co.
Detroit Graphite Co.
Hockaday Co.
Johnson & Co., Inc., Oliver.
Murphy's Sons, C. P.
Sonneborn Sons, Inc., L.
Toch Brothers.
Truscon Laboratories.
Wadsworth, Howland & Co.

ROPE—TRANSMISSION.
Allis-Chalmers Mfg. Co.
Cresson-Morris Co.
Link-Belt Company.

ROVING CANS.
(See Cans—Roving.)

ROVING MACHINERY.
Gessner, David
Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.

RUBBER COVERED ROLLS.
Stowe & Woodward Co.

RUBBER SPECIALTIES (TEXTILE MILLS).
Stowe & Woodward Co.

RUBBER STAMPS.
(See Stamps, Stencils, Etc.)

RUST PROOFING COMPOUND.
Toch Brothers.

SALTS.
(See Finishing & Sizing Materials.)

SASH OPERATOR (WINDOW).
Callahan Co., T. J.

SANITARY PRODUCTS.
Bundle-Spence Mfg. Co.
Vogel Co., Jos. A.

SANITARY ENGINEERS, CONTRACTORS & BUILDERS.
(See Engineers—Sanitary.)

SASH-WINDOW—STEEL.
(See Window Sash.)

SAWING MACHINES AND SAW BLADES.
Racine Tool & Mch. Co.

SAXOPHONES, ETC.
(See Musical Instruments.)

SCALES.
Toledo Scale Co.

SCALE PREVENTER—BOILER.
(See Boiler Feed Water Purification.)

SCREENS AND SIEVES—PERFORATED.
Allis-Chalmers Mfg. Co.
Erdle Perforating Co.
Link Belt Company.

SCREWS.
Wicaco Screw & Mch. Wks., Inc.

SCOURING MACHINERY.
(See Washers—Cloth.)

SCRUBBING MACHINE—FLOOR.
American Scrubbing Equip. Co.

SCRUBBING AND WASHING POWDERS.
Mathieson Alkali Works.
Warren Soap Mfg. Co.

SCUTCHERS.
Whitin Mch. Wks.

SECOND HAND MACHINERY AND SUPPLIES.
Battle-Ward Sales Co.
Nashville Industrial Corp.
Toomey, Frank, Inc.

SECTION BEAMS.
(See Beams.)

SELVAGE HARNESS.
(See Harness.)

SEPARATORS (STEAM).
Locke Regulator Co.

SEWING MACHINES.
Merrow Machine Co., The.
Textile Finishing Mchry. Co.

SHADES—ELECTRIC LAMP.
(See Reflectors.)

SHAFTING AND HANGERS.
Allis-Chalmers Mfg. Co.
Cresson-Morris Co.
Dodge Mfg. Co.
Fafnir Bearing Co.
Fulton Supply Co.
Hyatt Roller Bearing Co.
Link-Belt Company.
Skayef Ball Bearing Co.

SHARPENERS (ROCK DRILL STEEL).
Ingersoll-Rand Co.

SHEET STEEL (PLAIN AND GALVANIZED).
Ryerson & Son, Inc., Jos. T.

SHELVING—SECTIONAL STEEL.
Hyatt Roller Bearing Co.
Mills Co.

SHINGLES (METAL).
Cortright Metal Roofing Co.

SHINGLES—WOOD.
Southern Cypress Mfg. Assn.
Southern Wood Preserving Co.

SHIPPING ROOM MACHINERY AND SUPPLIES.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.
Hightower Box & Tank Co.
Smith Mfg. Co.
Toledo Scale Co.

SHOWER BATH CABINETS.
Mills Co.

SHUTTLES.
Brown Co., David.
Crompton & Knowles Loom Works.
Draper Corporation.
Jordan Mfg. Co.
Shambow Shuttle Co.
U S Bobbin & Shuttle Co.
Williams Co., J. H.

SILK MACHINERY
Eastwood, Benjamin.

SILK YARNS.
Judson Mills.
Meritner, H. S.
Tubize Artificial Silk Co. of America.

SINGEING MACHINERY.
Butterworth & Sons Co., H. W.
Phila. Drying Machine Co.
Textile Finishing Machinery Co., The.

SITES FOR FACTORIES.
(See Industrial Sites.)

SIZE BOX TEMPERATURE CONTROLLER.
Foxboro Co., Inc., The.

SIZE KETTLES AND TANKS.
(See Bleaching Kiers or Tanks.)

SIZING AND FINISHING COMPOUNDS.
(See Finishing and Sizing Materials.)

SKEWERS.
Jordan Mfg. Co.

SLAG FOR CONCRETE.
Birmingham Slag Co.

SLASHERS AND SLASHER ROOM SUPPLIES.
Butterworth & Sons Co., H. W.
Gessner, David
Howard & Bullough.
Mossberg Pressed Steel Corp.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

SLASHER CLOTH.
(See Cloth.)

SLASHER TAPE.
(See Tape—Slasher.)

SLATE ASPHALT ROOFING.
Barrett Co.

SLUBBERS.
Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.

SMOKE STACKS.
Walsh & Weidner Boiler Co.

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American Diamalt Co.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Ciba Co., Inc.
Fleischmann Co., The.
Kali Mfg. Co.
Klipstein & Co., A.
Lennig & Co., Chas.
Mathieson Alkali Works, Inc.
Newport Chemical Wks.
Rohm & Haas Co.
Sonneborn Sons, Inc., L.
Stein, Hall & Co.
United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

SOFTENERS—COTTON.
(See Finishing & Sizing Materials.)

SOFTENERS—WATER.
(See Water Softeners.)

SOLDERLESS CONNECTORS—FRANKEL.
Westinghouse Elec. & Mfg. Co.

SOLOZONE.
Roessler & Hasslacher Chem. Co.

SOLVENTS.
(See Finishing.)

SPEEDERS.
Jordan Mfg. Co.
Parker & Co., Walter L.
U S Bobbin & Shuttle Co.

SPEED VARYING TRANSMISSION.
Reeves Pulley Co.

SPEEDOMETERS.
(See Counters.)

SPINDLES.
Draper Corporation.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.
Wicaco Screw & Mch. Wks., Inc.

SPINNERS.
(See Yarn Manufacturers.)

SPINNING FRAMES.
American Machine Co., H. & B.
Crompton & Knowles Loom Works.
Gessner, David
Howard & Bullough.
Saco-Lowell Shops.
Schaum & Uhlinger.
Whitin Machine Works.

SPINNING RINGS.
Draper Corporation.
Fulton Supply Co.
Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.
Whitinsville Spinning Ring Co.

SPINNING TAPE SPECIALISTS.
American Textile Banding Co., Inc.
Barber Mfg. Co.

SPOOLING MACHINERY AND SUPPLIES.
Barber-Colman Co.
Draper Corporation.
Foster Mch. Co.
Gessner, David
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Whitin Machine Works.

SPOOLS AND SKEWERS.
Allen Co.
Brown Co., David.
Fulton Supply Co.
Jordan Mfg. Co.
Lestershire Spool & Mfg. Co.
Mossberg Pressed Steel Corp.
Parker Co., Walter L.
Steel Heddle Mfg. Co.
Smith Bobbin Wks., L. C.
Textile Products Co.
U S Bobbin & Shuttle Co.

SPRAYING DEVICE FOR PAINTING.
(See Paint Spray.)

SPRINKLER TANKS.
(See Tanks, Towers, Etc.)

SPROCKETS.
Link-Belt Company.
Morse Chain Co.

STAIR STEP TREADS (ANTI-SLIP).
American Abrasive Metals Co.

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Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.
Dixie Seal & Stamp Co.

STAND PIPES.
(See Tanks.)

STARCH AND GUMS.
American Diamalt Co.
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Borne, Scrymser Co.
Bosson & Lane.
Ciba Co.
Corn Products Refining Co
Fleischmann Co., The.
Kali Mfg. Co.
Klipstein & Co., A.
Keever Starch Co.
Mathieson Alkali Works, Inc.
Metz Co., H. A.
Newport Chemical Wks.
Penick & Ford Sales Co., Inc.
Sonneborn Sons, Inc., L.
Staley Co., A. E.
Stein, Hall & Co.
Warren Soap Mfg. Co.

STEAM ENGINES.
(See Engines—Steam.)

STEAM PUMPS.
(See Pumps—Steam.)

STEAM SEPARATORS.
(See Separators.)

STEAM TRAPS.
(See Traps—Steam.)

STEEL (BARS, SHAPES, PLATES, SHEETS, ETC.)
Ryerson & Son, Inc., Jos. T.

STEEL BUILDINGS.
Dowman, George.
Truscon Steel Co.

STEEL SASH.
(See Window Sash.)

STEEL SHELVING, DOORS, WINDOWS, PARTITIONS, ETC.
Truscon Steel Co.
Mills Co.

STENCILS AND STENCIL PAPERS.
(See Stamps and Stencils.)

STENCIL BRUSHES.
(See Marking Pots and Brushes.)

STENCIL CUTTING MACHINES.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

STICKS—PICKER.
(See Picker Sticks.)

STOOLS.
(See Furniture—Mill.)

STOP MOTION.
Crompton & Knowles Loom Works.
Draper Corporation.
Eclipse Textile Devices, Inc.
Whitin Machine Works.
Wildman Mfg. Co.

STOKERS.
Westinghouse Mach. & Mfg. Co.

STORAGE RACKS.
(See Shelving.)

STORAGE TANKS.
(See Tanks.)

STRAPS (LUG, CHECK, HEEL, TUGGER, PICKER, HARNESS, ETC.)
Atlanta Harness & Reed Co.
Bond Co., Chas.
Fulton Supply Co.
Garland Mfg. Co.
Graton & Knight Mfg. Co.
Jacobs Mfg. Co., E. H.

STRAPPING.
(See Leather Specialties or Check Straps.)

STREET LIGHTING FIXTURES
General Elec. Co.
Huntington & Guerry, Inc.
Westinghouse Elec. & Mfg. Co.

STRICKLES.
Howard Bros. Mfg. Co.

SULPHIDES.
(See Finishing & Sizing Materials.)

SUPPLIES—GENERAL MILL.
Dodge Mfg. Co.
Fulton Supply Co.
Graton & Knight Mfg. Co.
Jenkins Bros.
Link-Belt Co.
Lunkenheimer Co.
Mills & Lupton Supply Co.
Morse Chain Company.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

SUPPLIES (OFFICE).
(See Office Equipment.)

SWEEPS.
(See Brushes.)

SWINGS (PLAYGROUND).
(See Playground Equipment.)

SWITCHES—KNIFE-ELECTRIC.
Fulton Supply Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

SWITCHBOARDS—PANEL.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

SYSTEMS (BUSINESS).
Ernst & Ernst.

TABLES (METAL).
(See Furniture.)

TACHOMETERS (RECORDING AND INDICATING).
Foxboro Co., Inc., The.
Root Co.

TALLOW.
(See Finishing Machinery.)

TANKS (ELEVATED).
Lombard Iron Works.
Walsh & Weidner Boiler Co.

TANKS—OIL.
Bowser & Co., Inc., S. F.

TANKS (SPRINKLER).
Lombard Iron Works.

TANKS (STEEL STORAGE).
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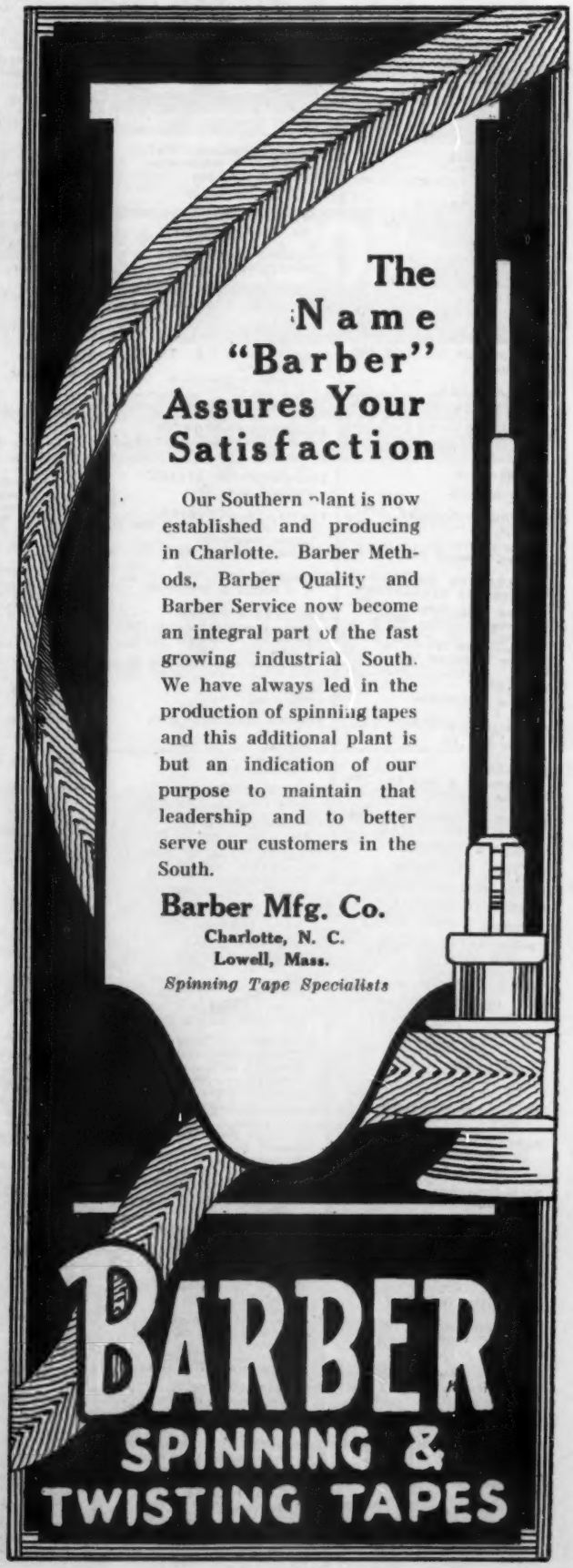

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SPINNING & TWISTING TAPES

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Hightower Box & Tank Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Mchry. Co.

TAPE LOOMS—COTTON.
Gessner, David
Fletcher Works.
Schaum & Uhlinger.

TAPES AND BRAIDS.
American Textile Banding Co., Inc.
Barber Mfg. Co.
Weimar Brothers.

TAPES—SPINNING AND TWISTING.
Barber Mfg. Co.

TAPE MAKING MACHINES.
(See Bandage and Tape Machinery.)

TAPIOCA FLOUR.
Stein, Hall & Co.

TARPAULINS.
Smith Mfg. Co.

TAX SERVICE.
Ernst & Ernst.

TELEPHONE—CALLING SYSTEM.
Carter Electric Co.
General Electric Co.

TEMPERATURE CONTROLLERS AND REGULATORS.
Carrier Eng. Corp.
Foxboro Co., Inc., The
Fulton Co.
Parks-Cramer Co.
Taylor Instrument Co.

TEMPLES.
Draper Corporation.

TENTS (ALL KINDS).
Smith Mfg. Co.

TENTERS.
Butterworth & Sons Co., The
Textile Finishing Mach. Co.

TENTER HOUSING & RECONSTRUCTING SYSTEM.
Proctor & Schwartz, Inc.

TEXTILE MACHINERY.
(See Cotton Mill Machinery.)

THEATRE EQUIPMENT.
Southern Theatre Equip. Co.

THERMOMETER—ANGLE AND STRAIGHT STEM.
Foxboro Co., Inc., The
Taylor Instrument Co.

THERMOMETERS—RECORDING AND INDEX.
Foxboro Co.
Taylor Instrument Co.

THERMOSTATS.
Foxboro Co.

THIN PLACE PREVENTERS.
Draper Corporation.

THREAD GUIDES.
Mitchell-Bissell Co.
Palmer Co., The I. E.

TILE ROOFING.
Richardson Co.

TIMBER.
(See Lumber.)

TIME CLOCKS.
(See Clocks.)

TIES—BALING.
(See Bale Ties.)

TIRE FABRIC EQUIPMENT.
Fletcher Works.

TOILETS.
Rundle-Spence Mfg. Co.
Vogel Co., Jos. A.

TOILET PARTITIONS—METAL.
Mills Co.

TOOLS (MACHINE—HAND & ELECTRIC).
Fulton Supply Co.
Independent Pneumatic Tool Co.
Ryerson & Son, Inc., Jos. T.

TOOLS (PNEUMATIC).
Ingersoll-Rand Co.

TOOL CABINETS—METAL.
Mills Co.

TOOL STANDS—METAL.
Mills Co.

TOP FLATS RECOVERED.
Howard Bros. Mfg. Co.

TORCHES (BRAZING, CUTTING AND WELDING).
Bird-Potts Co., Inc.
Oxweld Acetylene Co.

TOWERS.
(See Tanks—Elevated.)

TRACTORS (ELECTRIC).
Elwell-Parker Electric Co.

TRADEMARKING EQUIPMENT
Continental Trademark Co., Inc.
Kaumagraph Co.

TRANSFERS FOR TRADEMARKING.
Continental Trademark Co., Inc.
Kaumagraph Co.

TRANSMISSION—POWER.
(See Power Transmission Machinery.)

TRAPS—RETURN STEAM.
Morehead Mfg. Co.

TRAVELERS—CONVEYOR.
Curtis Pneumatic Mchry. Co.
Louden Mchry. Co.
Mathews Conveyer Co.

TRIPTODS.
U S Bobbin & Shuttle Co.

TROLLEYS & HOISTS.
Curtis Pneumatic Machy. Co.
Elwell-Parker Electric Co.
Louden Mchry. Co.
Ryerson & Son, Inc., Jos. T.

TRUCKS—AUTO.
White Co.

TRUCKS, BASKETS, ETC.
Allen Co.
Hasking Co., B. G.
Smith Mfg. Co.
Washburn, Inc.

TRUCKS (BEAM).
Allen Company.

TRUCKS (ELECTRIC).
Elwell-Parker Electric Co.

TRUCKS (HAND & POWER)—INTER, ETC.
Allen Company.
Elwell-Parker Electric Co.

TRUCKS (WELDERS).
Oxweld Acetylene Co.

TUBES AND CONES.
Sonoco Products Co.

TUBS.
(See Tanks—Wooden.)

TUBING—METAL.
Youngstown Sheet & Tube Co.

TURBINES—HYDRAULIC.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

TURBINES—STEAM.
Allis-Chalmers Mfg. Co.
American Blower Co.
General Electric Co.
Sturtevant Co., B. F.
Westinghouse Elec. & Mfg. Co.

TURBO UNDERGRATE BLOWERS.
Carrier Air Conditioning Co.

TWISTING MACHINERY AND SUPPLIES.
Barber Mfg. Co.
Draper Corporation.
Foster Mch. Co.
Gessner, David
Howard & Bullough.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
U S Bobbin & Shuttle Co.
Whitin Machine Works.

UNIONS—BRONZE.
Fulton Supply Co.
Jenkins Bros.
Lunkenheimer Co.

URINALS.
Rundle-Spence Mfg. Co.
Vogel Co., Jos. A.

VACUUM GAUGES.
(See Gauges.)

VACUUM PANS.
Creamer-Morris Co.

VALVES—ANGLE, GLOBE, CROSS, BLOW-OFF, CHECK, GATE, POP-SAFETY, ETC.
Fulton Supply Co.
Jenkins Bros.
Lunkenheimer Co.

VALVES (BACK PRESSURE).
Jenkins Bros.
Lunkenheimer Co.
Oxweld Acetylene Co.

VALVES—NON-RETURN STOP.
Fulton Supply Co.
Jenkins Bros.
Lunkenheimer Co.

VARIABLE SPEED TRANSMISSION.
Reeves Pulley Co.

VARNISHES.
(See Paints.)

VATS.
(See Tanks—Wooden.)

VENTILATING APPARATUS.
Buffalo Forge Co.
Carrier Air Conditioning Co.
Carrier Eng. Corp.
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Sargent's Sons Co., C. G.
Tolhurst Machine Co.

VILLAGE ARCHITECTS AND DESIGNERS.
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Sirrine, J. E.

VILLAGE HOUSES.
(See Houses—Ready Built.)

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Westinghouse Elec. & Mfg. Co.

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Richardson Co.

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(See Buildings.)

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(See Doors and Hardware.)

WAREHOUSE TRUCKS.
(See Trucks.)

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Barber-Colman Co.
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Warp Compressing Mch. Co.

WARPERS AND WARPING MACHINERY AND SUPPLIES.
Barber-Colman Co.
Draper Corporation.
Eastwood, Benjamin.
Foster Mch. Co.
Gessner, David
Howard & Bullough.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
U S Bobbin & Shuttle Co.
Warp Compressing Mch. Co.

WASH BASINS.
(See Lavatories.)

WASHERS—CLOTH.
American Laundry Mchry. Co.
Butterworth & Sons Co., H. W.
Gessner, David
Hunt Machine Co., Rodney.
Klauder-Weldon Dyeing Mch. Co.
Philadelphia Drying Mchry. Co.
Textile Finishing Mchry. Co.
Tolhurst Mch. Wks.

WASTE MACHINERY—COTTON.
Howard & Bullough.
Gessner, David
Logemann Bros.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Sargent's Sons Co., C. G.
Schofield Co., Wm.
Whitin Machine Co.

WASTE SEPARATORS.
(See Separators.)

WATCHMAN CLOCKS.
(See Clocks—Watchman.)

WATER COOLERS—FOUNTAIN.
Rundle-Spence Mfg. Co.

WATER SOFTENERS AND PURIFIERS.
Hungerford & Terry, Inc.

WATER SUPPLY SYSTEMS.
Sydnor Pump & Well Co., Inc.

WATER TOWERS.
(See Tanks—Elevated.)

WATERPROOFING MACHINERY.
Butterworth & Sons Co., H. W.
Textile Finishing Machinery Co., The.

WATERPROOFING FOR CONCRETE.
Truscon Laboratories.

WEAVING.
(See Yarn Manufacturers.)

WEAVERS KNOTTER.
(See Knotters.)

WELDING APPARATUS—ELECTRIC ARC.
Bird-Potts Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

WELDING AND CUTTING APPARATUS AND SUPPLIES—OXY-ACETYLENE.
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Fulton Supply Co.
Oxweld Acetylene Co.

WELDING—JOB.
Bird-Potts Co., Inc.
Briggs-Shaffner Co.

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(See Village Architects.)

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American Laundry Mchry. Co.
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Cramp Mfg., C. G.
Mills Co.
Rundle-Spence Mfg. Co.
Smith Mfg. Co.
Westinghouse Elec. & Mfg. Co.

WELL DRILLING.
Sydnor Pump &Well Co., Inc.

WHEELS—FIBRE.
(See Fibre Products.)

WHEEL PULLER.
General Electric Co.

WHISTLES—STEAM AND AIR.
Fulton Supply Co.
Jenkins Bros.
Lunkenheimer Co.

WHIZZERS.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Mach. Wks.

WINDERS.
Eastwood, Benjamin.
Firsching, J. A.
Foster Mch. Co.
Gessner, David
Howard & Bullough American Machine Co.
Saco-Lowell Shops.
Universal Winding Co.

WINDOW FRAMES AND SASH—STEEL.
Truscon Steel Co.

WINDOW SASH OPERATOR.
Callahan Co., T. G.

WIRES—DROP.
(See Drop Wires.)

WIRE FENCING, PARTITIONS & MACHINERY GUARDS.
Cyclone Fence Co.

WIRE HEDDLES.
(See Heddles.)

WIRE (STEEL).
Ryerson & Co., Inc., Jos. T.

WIRE (WELDING).
Oxweld Acetylene Co.

WIRING CONDUITS AND FITTINGS.
(See Electric Machinery and Supplies.)

WIRING—ELECTRICAL.
(See Electrical Contractors.)

WOOD.
(See Lumber.)

WOOD BLOCK FLOORING.
Southern Wood Preserving Co.

WOOD BOXES.
(See Packing Cases.)

WOOD PRESERVERS.
American Cement Paint Co.
Dixon Crucible Co., Jos.
Johnson & Co., Inc., Oliver.
Truscon Laboratories.
Wadsworth, Howland & Co., Inc.

WOOD PULLEYS.
(See Pulleys.)

WOOD TANKS.
(See Tanks.)

WOODEN SPECIALTIES.
Allen Company.

WOOLEN MACHINERY.
Butterworth & Sons Co., H. W.
Crompton & Knowles Loom Works.
Phila. Drying Machinery Co.
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Sargent's Sons Corp., C. G.
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Textile Finishing Mchry. Co.
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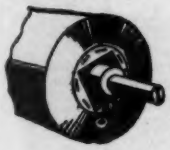

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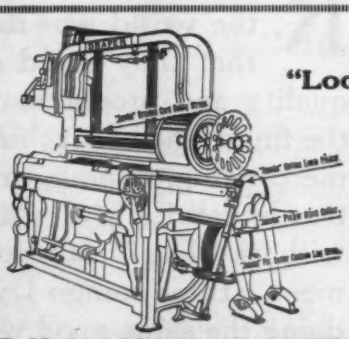

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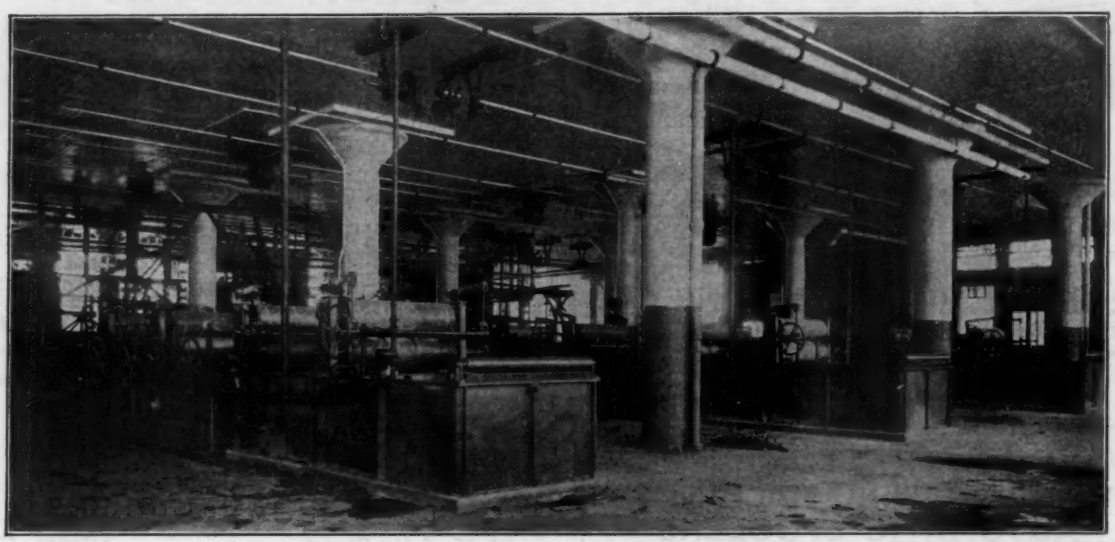

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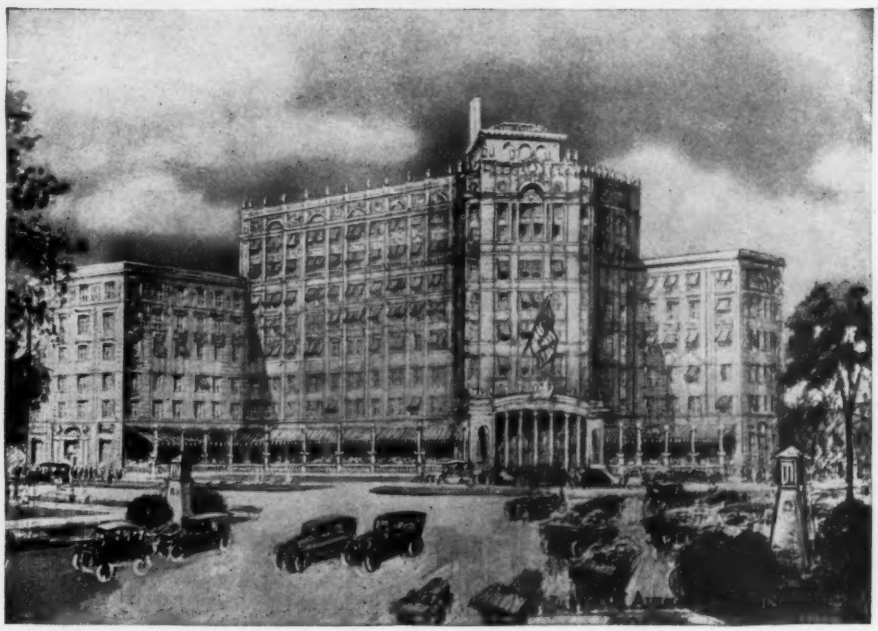

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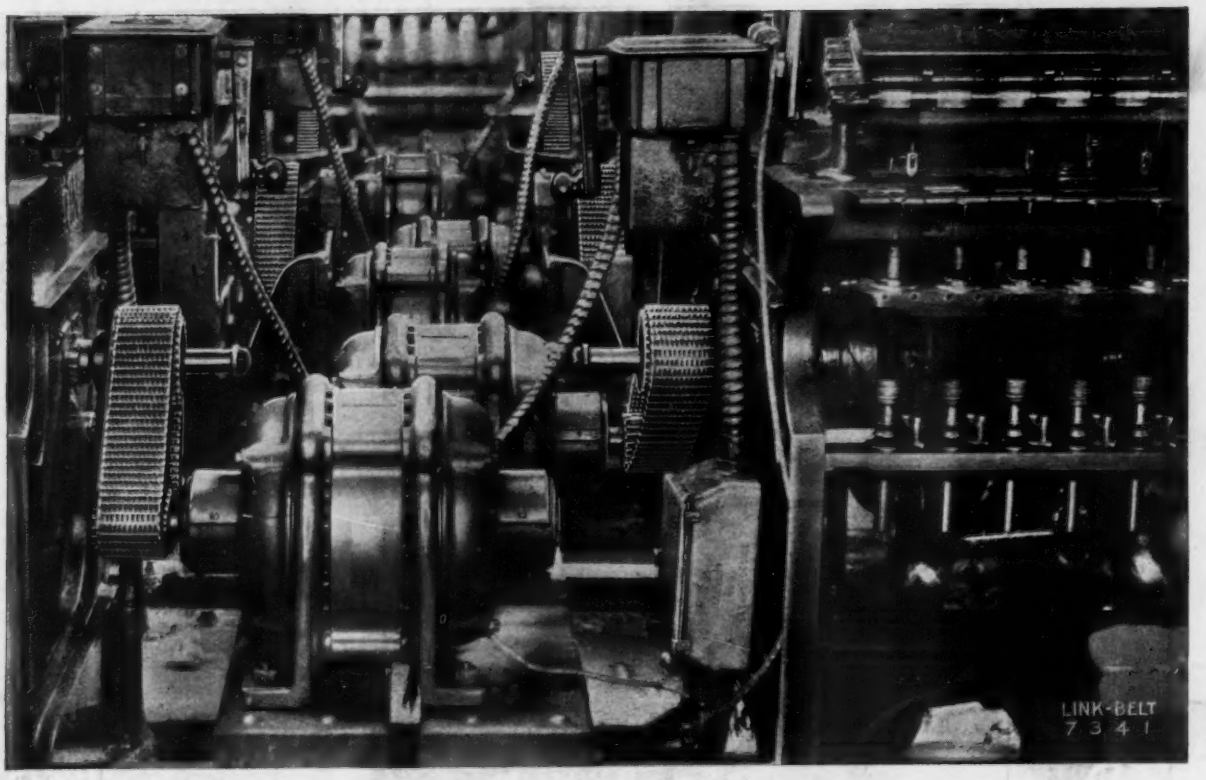

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